EXHIBIT D-1
Defendant's Preliminary Invalidity Contentions
Orckit Corporation v. Cisco Systems, Inc., 2:22-cv-00276-JRG-RSP

Chart for U.S. Patent 10,652,111 ("the '111 Patent")
U.S. Patent Publication No. 2012/0300615 to Kempf et al. ("Kempf")

As shown in the chart below, all Asserted Claims of the '111 Patent are invalid under (1) AIA-35 U.S.C. § 102 (a) because Kempf meets each element of those claims, and/or (2) 35 U.S.C. § 103 because Kempf renders those claims obvious either alone, or in combination with the knowledge of a person having ordinary skill in the art, and in further combination with the references specifically identified below and in the following claim chart and/or one or more references identified in Defendant's Preliminary Invalidity Contentions. The following quotations and diagrams come from Kempf titled "Implementing EPC In A Cloud Computer With OpenFlow Data Plane", which was filed on June 28, 2012, and published on November 29, 2012.

Motivations to combine the disclosures in Kempf with disclosures in other publications known in the art, as explained in this chart, include at least the similarity in subject matter between the references to the extent they concern methods relating to routing certain network traffic to entities for further analysis and inspection. Insofar as the references cite other patents or publications, or suggest additional changes, one of ordinary skill in the art would look beyond a single reference to other references in the field.

These invalidity contentions are based on Defendant's present understanding of the Asserted Claims, and Orckit's apparent construction of the claims in its November 3, 2022 Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1, and Orckit's January 19, 2023 First Amended Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1 (Orckit's "Infringement Disclosures"), which is deficient at least insofar as it fails to cite any documents or identify accused structures, acts, or materials in the Accused Products with particularity. Defendant does not agree with Orckit's application of the claims, or that the claims satisfy the requirements of 35 U.S.C. § 112. Defendant's contentions herein are not, and should in no way be seen as, admissions or adoptions as to any particular claim scope or construction, or as any admission that any particular element is met by any accused product in any particular way. Defendant objects to any attempt to imply claim construction from this chart. Defendant's prior art invalidity contentions are made in a variety of alternatives and do not represent Defendant's agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein.

The following contentions are subject to revision and amendment pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules, and the Orders of record in this matter subject to further investigation and discovery regarding the prior art and the Court's construction of the claims at issue.

No.	'111 Patent Claim 1	Kempf
1[preamble]	A method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising:	Kempf discloses a method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising. For example, Kempf discloses a method in which a network element such as a router, switch, or bridge communicatively interconnects other elements of a network for data packet transport. Kempf further discloses a method in which the network element is controlled by an external OpenFlow controller. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Kempf at Abstract ("A method implements a control plane of an evolved packet core (EPC) of a long term evolution (LTE) network in a cloud computing system. A cloud manager monitors resource utili-zation of each control plane module and the control plane traffic handled by each control plane module. The cloud man-ager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane module is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module signals the plurality of network elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).") Kempf at [0004] ("The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.")

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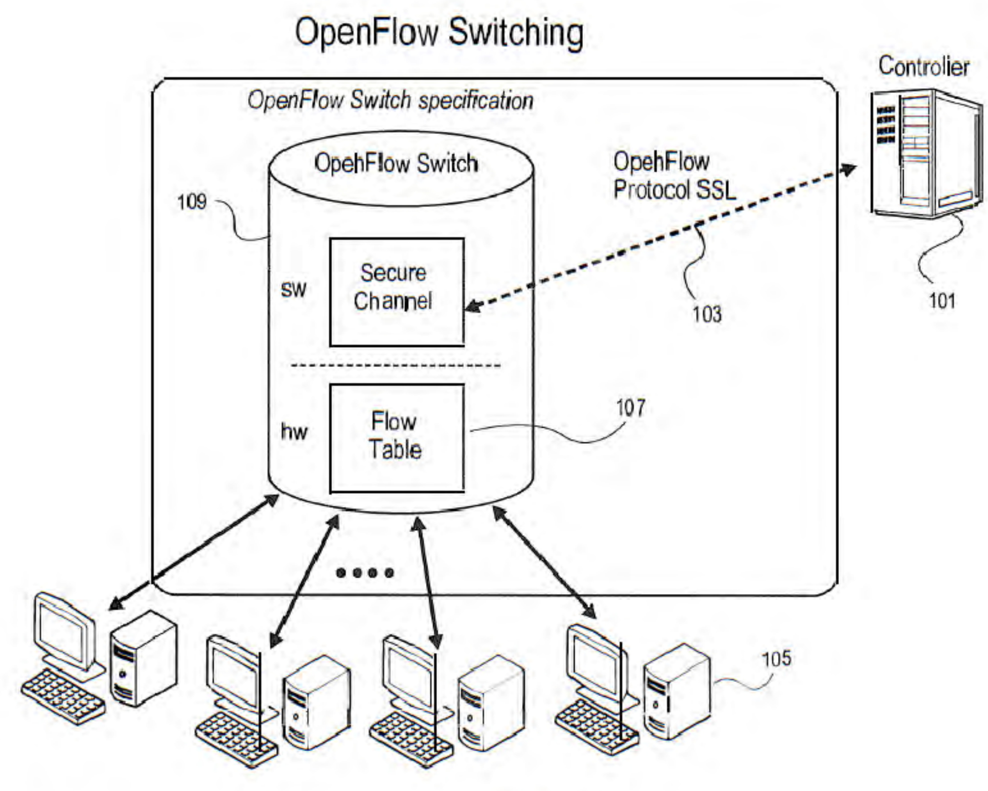
		Kempf at [0033] (“As used herein, a network element (e.g., a router, switch, bridge, etc.) is a piece of networking equipment, including hardware and software, that communicatively interconnects other equipment on the network (e.g., other network elements, end stations, etc.). Some network elements are "multiple services network elements" that provide sup-port for multiple networking functions (e.g., routing, bridg-ing, switching, Layer 2 aggregation, session border control, multicasting, and/or subscriber management), and/or provide support for multiple application services (e.g., data, voice, and video). Subscriber end stations (e.g., servers, worksta-tions, laptops, palm tops, mobile phones, smart phones, mul-timedia phones, Voice Over Internet Protocol (VOIP) phones, portable media players, GPS units, gaming systems, set-top boxes (STBs), etc.) access content/services provided over the Internet and/or content/services provided on virtual private networks (VPN s) overlaid on the Internet. The content and/or services are typically provided by one or more end stations (e.g., server end stations) belonging to a service or content provider or end stations participating in a peer to peer service, and may include public web pages (free content, store fronts, search services, etc.), private web pages (e.g., username/pass-word accessed web pages providing email services, etc.), corporate networks over VPNs, IPTV, etc. Typically, sub-scriber end stations are coupled (e.g., through customer premise equipment coupled to an access network (wired or wirelessly)) to edge network elements, which are coupled (e.g., through one or more core network elements to other edge network elements) to other end stations (e.g., server end stations).”) Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at Figure 1

No.	'111 Patent Claim 1	Kempf
		 Kempf at Figure 2

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		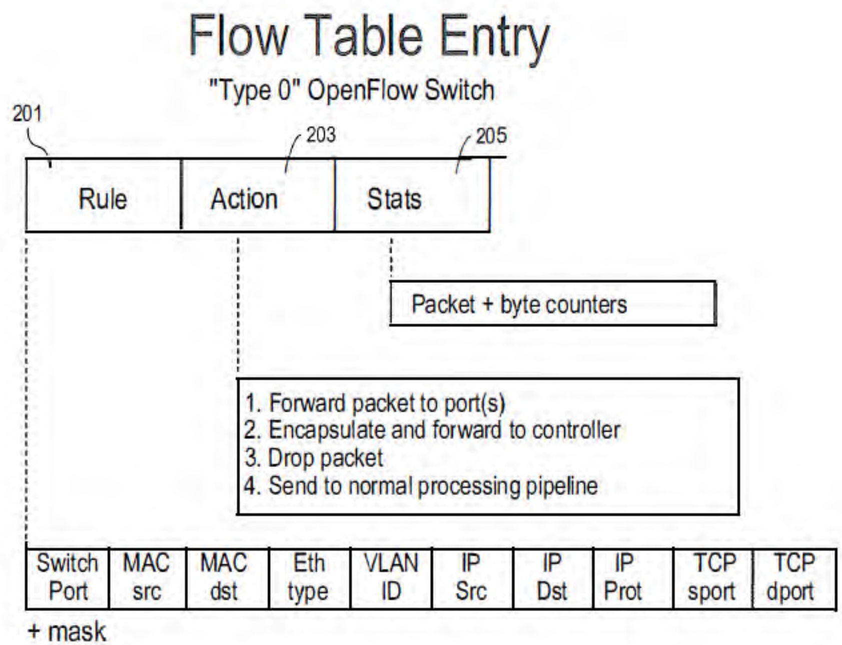 FIG. 2
1[a]	sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion;	Kempf discloses sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion. For example, Kempf discloses sending by the OpenFlow controller to the network element a rule defining matches for fields in packet headers. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Kempf at [0044] ("FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0

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		protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.") Kempf at [0046] ("A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.")

No.	’111 Patent Claim 1	Kempf
		Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0074] (“The operation of the EPC cloud computer system as follows. The UE 1317, E-NodeB 1317, S-GW-C 1307, and P-GW-C signal 1307 to the MME, PCRF, and HSS 1307 using the standard EPC protocols, to establish, modify, and delete bearers and GTP tunnels. This signaling triggers pro-cedure calls with the OpenFlow controller to modify the routing in the EPC as requested. The OpenFlow controller configures the standard OpenFlow switches, the Openflow S-GW-D 1315, and P-GW-D 1311 with flow rules and actions to enable the routing requested by the control plane entities. Details of this configuration are described in further detail herein below.”)

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		Kempf at [0079] ("FIG. 16 is a diagram of one embodiment of a process for EPC peering and differential routing for specialized ser-vice treatment. The OpenFlow signaling, indicated by the solid lines and arrows 1601, sets up flow rules and actions on the switches and gateways within the EPC for differential routing. These flow rules direct GTP flows to particular loca-tions. In this example, the operator in this case peers its EPC with two other fixed operators. Routing through each peering point is handled by the respective P-GW-Dl and P-GW-D2 1603A, B. The dashed lines and arrows 1605 show traffic from a UE 1607 that needs to be routed to another peering operator. The flow rules and actions to distinguish which peering point the traffic should traverse are installed in the OpenFlow switches 1609 and gateways 1603A, B by the OpenFlow controller 1611. The OpenFlow controller 1611 calculates these flow rules and actions based on the routing tables it maintains for outside traffic, and the source and destination of the packets, as well as by any specialized for-warding treatment required for DSCP marked packets.") Kempf at [0080] ("The long dash and dotted lines and arrows 1615 shows a example of a UE 1617 that is obtaining content from an external source. The content is originally not formulated for the UE's 1617 screen, so the OpenFlow controller 1611 has installed flow rules and actions on the P-GW-Dl 1603B, S-GW-D 1619 and the OpenFlow switches 1609 to route the flow through a transcoding application 1621 in the cloud computing facility. The transcoding application 1621 refor-mats the content so that it will fit on the UE's 1617 screen. A PCRF requests the specialized treatment at the time the UE sets up its session with the external content source via the IP Multimedia Subsystem (IMS) or another signaling protocol.") Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following

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		bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0085] (“The OpenFlow controller instantiates a virtual port for each physical port that may transmit or receive packets routed through a GTP tunnel, prior to installing any rules in the switch for GTP TEID routing.) Kempf at [0089] (“n one embodiment, the system implements a GTP fast path encapsulation virtual port. When requested by the S-GW-C and P-GW-C control plane software running in the cloud computing system, the OpenFlow controller programs the gateway switch to install rules, actions, and TEID hash table entries for routing packets into GTP tunnels via a fast path GTP encapsulation virtual port. The rules match the packet filter for the input side of GTP tunnel's bearer. Typi-cally this will be a 4 tuple of: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The IP source address and destination address are typically the addresses for user data plane traffic, i.e. a UE or Internet service with which a UE is transacting, and similarly with the port numbers. For a rule matching the GTP-U tunnel input side, the associated instructions and are the following: Write-Metadata (GTP-TEID, OxFFFFFFFF) Apply-Actions (Set-Output-Port GTP-Encap-VP)”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”)

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		Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0097] (“In one embodiment, the system implements han-dling of G-PDU packets with extension headers, sequence numbers, and N-PDU numbers. G-PDU packets with exten-sion headers, sequence numbers, and N-PDU numbers need to be forwarded to the local switch software control plane for processing. The OpenFlow controller programs 3 rules for this purpose. They have the following common header fields: the IP destination address is an IP address on which the gateway is expecting GTP traffic; and the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152).”) Kempf at [0099] (“The instruction for these rules is the following: Apply-Actions (Set-Output-Port LOCAL_GTP _U_DECAP)”) Kempf at [0104] (“In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.”)

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		Kempf at [0108] (“A GTP-extended Openflow switch contains at least one flow table that handles rules matching the GTP header fields as in FIG. 17. The Openflow controller programs the GTP header field rules in addition to the other fields to per-form GTP routing and adds appropriate actions if the rule is matched. For example, the following rule matches a GTP-C control packet directed to a control plane entity (MME, S-GW-C, P-GW-C) in the cloud computing system, which is not in the control plane VLAN: the VLAN tag is not set to the control plane VLAN, the destination IP address field is set to the IP address of the targeted control plane entity, the IP protocol type is UDP (17), the UDP destination port is the GTP-C destination port (2123), the GTP header flags and message type is wildcarded with 0xF0 and the matched ver-sion and protocol type fields are 2 and 1, indicating that the packet is a GTPv2 control plane packet and not GTP'.”)
1[b]	receiving, by the network node from the controller, the instruction and the criterion;	Kempf discloses receiving, by the network node from the controller, the instruction and the criterion. *See supra at* 1[a].
1[c]	receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity;	Kempf discloses receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity. For example, Kempf discloses communication between electronic devices in which data packets are sent from one electronic device to another destination device. Kempf at [0003] (“The general packet radios system (GPRS) is a sys-tem that is used for transmitting Internet Protocol packets between user devices such as cellular phones and the Internet. The GPRS system includes the GPRS core network, which is an integrated part of the global system for mobile communi-cation (GSM). These systems are widely utilized by cellular phone network providers to enable cellular phone services over large areas.”) Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway

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		GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.") Kempf at [0032] ("The techniques shown in the figures can be imple-mented using code and data stored and executed on one or more electronic devices (e.g., an end station, a network ele-ment, etc.). Such electronic devices store and communicate (internally and/or with other electronic devices over a net-work) code and data using non-transitory machine-readable or computer-readable media, such as non-transitory machine-readable or computer-readable storage media (e.g., magnetic disks; optical disks; random access memory; read only memory; flash memory devices; and phase-change memory). In addition, such electronic devices typically include a set of one or more processors coupled to one or more other compo-nents, such as one or more storage devices, user input/output devices (e.g., a keyboard, a touch screen, and/or a display), and network connections. The coupling of the set of proces-sors and other components is typically through one or more busses and bridges (also termed as bus controllers). The stor-age devices represent one or more non-transitory machine-readable or computer-readable storage media and non-tran-sitory machine-readable or computer-readable communication media. Thus, the storage device of a given electronic device typically stores code and/or data for execu-tion on the set of one or more processors of that electronic device. Of course, one or more parts of an embodiment of the invention may be implemented using different combinations of software, firmware, and/or hardware.") Kempf at [0033] ("As used herein, a network element (e.g., a router, switch, bridge, etc.) is a piece of networking equipment, including hardware and software, that communicatively interconnects other equipment on the network (e.g., other network elements, end stations, etc.). Some network elements are "multiple services network elements" that provide sup-port for multiple networking functions (e.g., routing, bridg-ing, switching, Layer 2 aggregation, session border control, multicasting, and/or subscriber management), and/or provide support for multiple application services (e.g., data, voice, and video). Subscriber end stations (e.g., servers, worksta-tions, laptops, palm tops, mobile phones, smart phones, mul-timedia phones, Voice Over Internet Protocol (VOIP) phones, portable media players, GPS units, gaming systems, set-top boxes (STBs), etc.) access content/services provided over the Internet and/or content/services provided on virtual private networks (VPN s).

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		overlaid on the Internet. The content and/or services are typically provided by one or more end stations (e.g., server end stations) belonging to a service or content provider or end stations participating in a peer to peer service, and may include public web pages (free content, store fronts, search services, etc.), private web pages (e.g., username/pass-word accessed web pages providing email services, etc.), corporate networks over VPNs, IPTV, etc. Typically, sub-scriber end stations are coupled (e.g., through customer premise equipment coupled to an access network (wired or wirelessly)) to edge network elements, which are coupled (e.g., through one or more core network elements to other edge network elements) to other end stations (e.g., server end stations).") Kempf at [0040] ("The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.") Kempf at [0079] ("FIG. 16 is a diagram of one embodiment of a process for EPC peering and differential routing for specialized ser-vice treatment. The OpenFlow signaling, indicated by the solid lines and arrows 1601, sets up flow rules and actions on the switches and gateways within the EPC for differential routing. These flow rules direct GTP flows to particular loca-tions. In this example, the operator in this case peers its EPC with two other fixed operators. Routing through each peering point is handled by the respective P-GW-Dl and P-GW-D2 1603A, B. The dashed lines and arrows 1605 show traffic from a UE 1607 that needs to be routed to another peering operator. The flow rules and actions to distinguish which peering point the traffic should traverse are installed in the OpenFlow switches 1609 and gateways 1603A, B by the OpenFlow controller 1611. The OpenFlow controller 1611 calculates these flow rules and actions based on the routing tables it maintains for outside

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		traffic, and the source and destination of the packets, as well as by any specialized for-warding treatment required for DSCP marked packets.”)
1[d]	checking, by the network node, if the packet satisfies the criterion;	Kempf discloses checking, by the network node, if the packet satisfies the criterion. For example, Kempf discloses determining by the network element if the packet header field matches an associated action in the flow table. Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all

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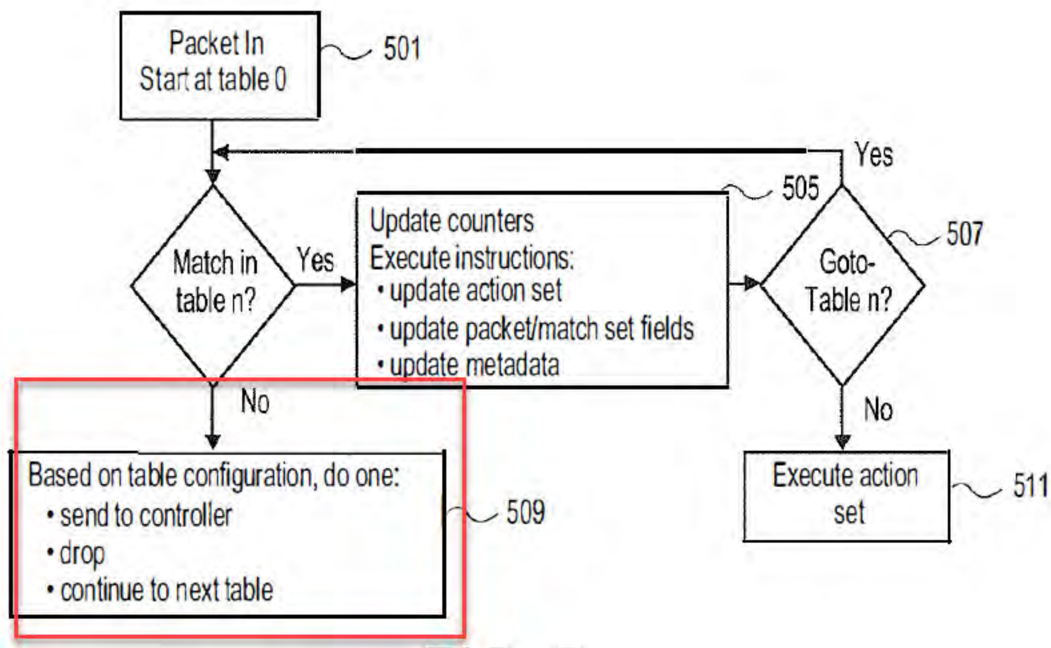
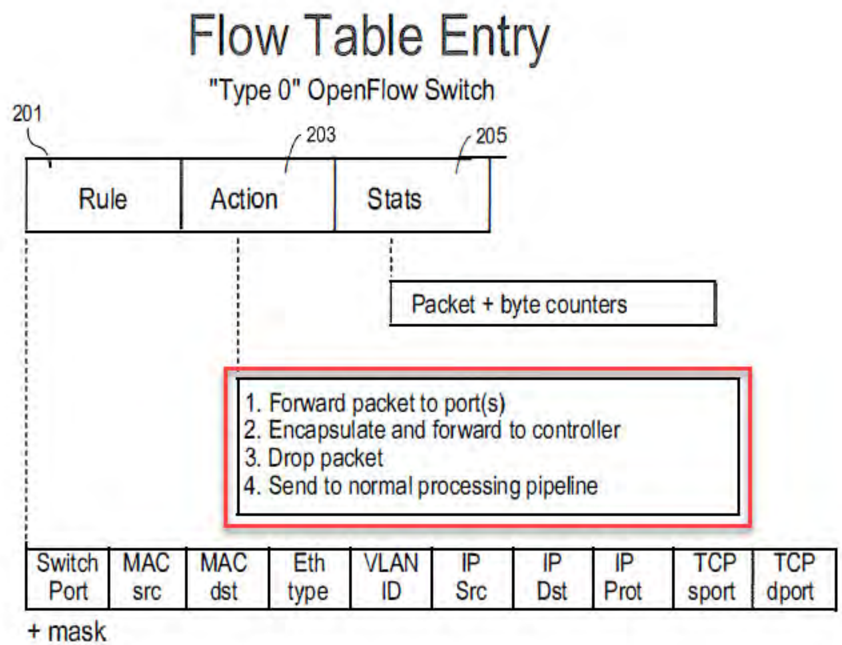
		outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”)

No.	’111 Patent Claim 1	Kempf
1[e]	responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity; and	Kempf discloses responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity. For example, Kempf discloses sending the packet from the network element to the destination device in response to the packet not matching the action in the flow table. Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”)

No.	'111 Patent Claim 1	Kempf
		Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.") Kempf at [0050] ("FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.") Kempf at [0051] ("FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is

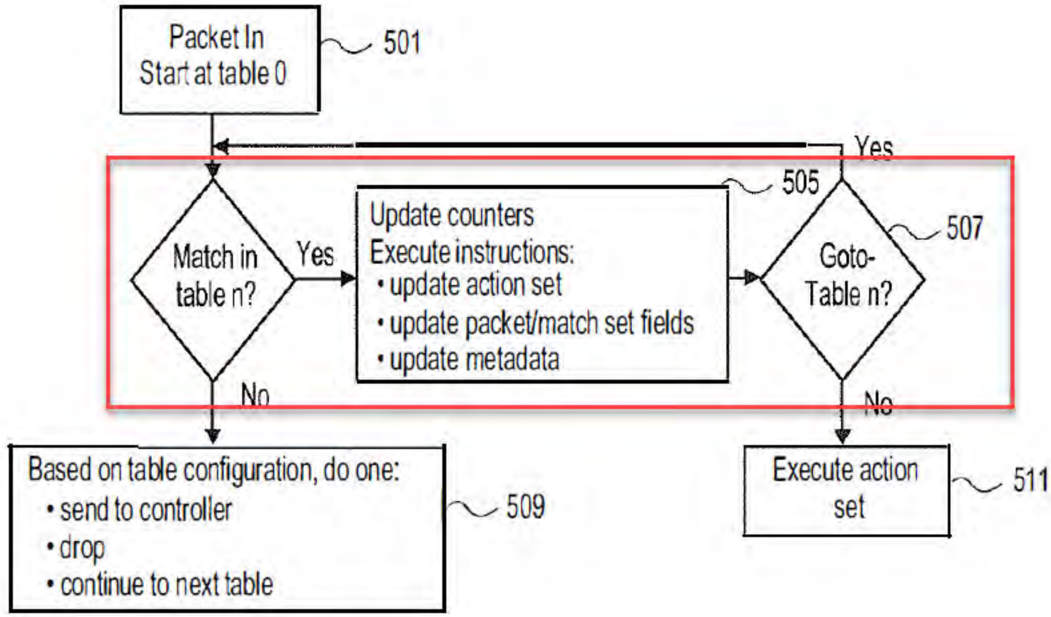
No.	’111 Patent Claim 1	Kempf
		executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0053] (“In one embodiment, a group table can be supported in conjunction with the OpenFlow 1.1 protocol. Group tables enable a method for allowing a single flow match to trigger forwarding on multiple ports. Group table entries consist of four fields: a group identifier, which is a 32 bit unsigned integer identifying the group; a group type that determines the group's semantics; counters that maintain statistics on the group; and an action bucket list, which is an ordered list of action buckets, where each bucket contains a set of actions to execute together with their parameters.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”)

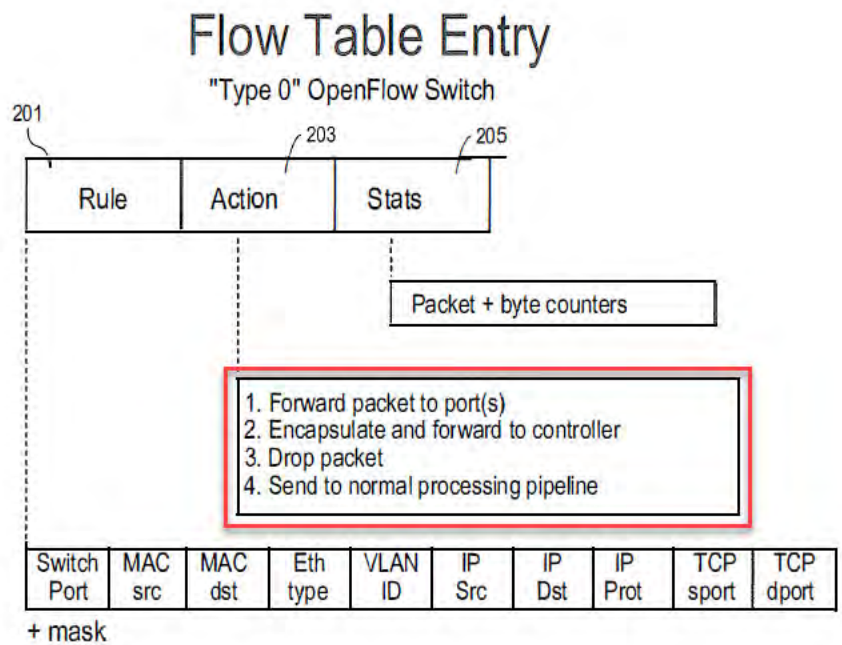
No.	'111 Patent Claim 1	Kempf
		Kempf at Figure 5 (annotation added)  FIG. 5 Kempf at Figure 2 (annotation added)

No.	’111 Patent Claim 1	Kempf
		 FIG. 2
1[f]	responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity.	Kempf discloses responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity. For example, Kempf discloses sending the packet from the network element to the controller or another table, in response to the packet matching the corresponding action in the flow table.

No.	’111 Patent Claim 1	Kempf
		Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”)

No.	’111 Patent Claim 1	Kempf
		Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0106] (“This encapsulates the packet and sends it to the OpenFlow controller.”) Kempf at Figure 5 (annotation added)

No.	'111 Patent Claim 1	Kempf
		 FIG. 5 Kempf at Figure 2 (annotation added)

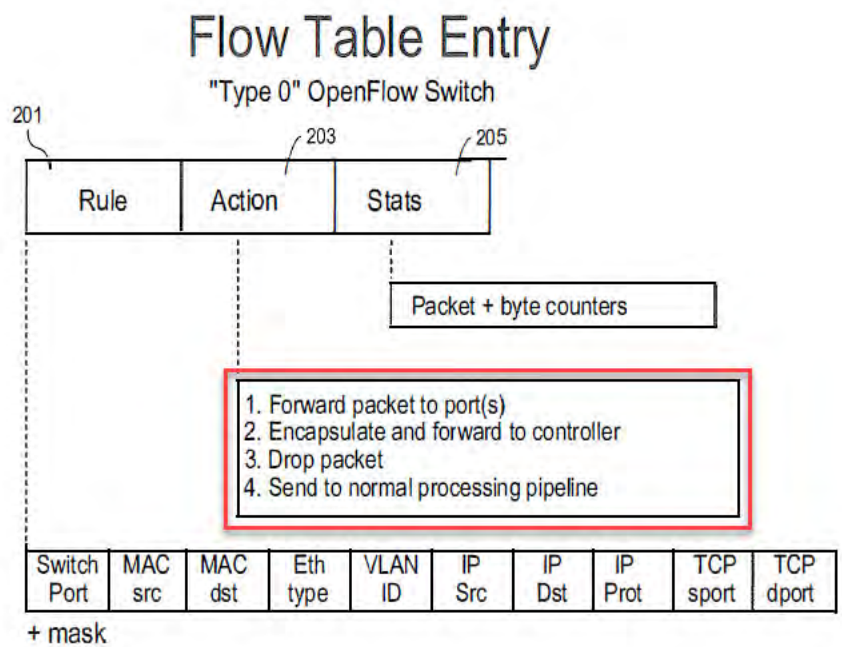
No.	'111 Patent Claim 1	Kempf
		 FIG. 2

No.	'111 Patent Claim 2	Kempf
2[a]	The method according to claim 1, wherein the instruction is 'probe', 'mirror', or 'terminate' instruction, and	Kempf discloses the method according to claim 1, wherein the instruction is 'probe', 'mirror', or 'terminate' instruction. For example, Kempf discloses actions associated with a flow match that may be require further processing, duplication, or dropping. A person of ordinary skill in the art would understand that the actions associated with a flow match may be any action, including

No.	'111 Patent Claim 2	Kempf
		probe, mirror, or terminate. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.") Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.") Kempf at [0051] ("FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is

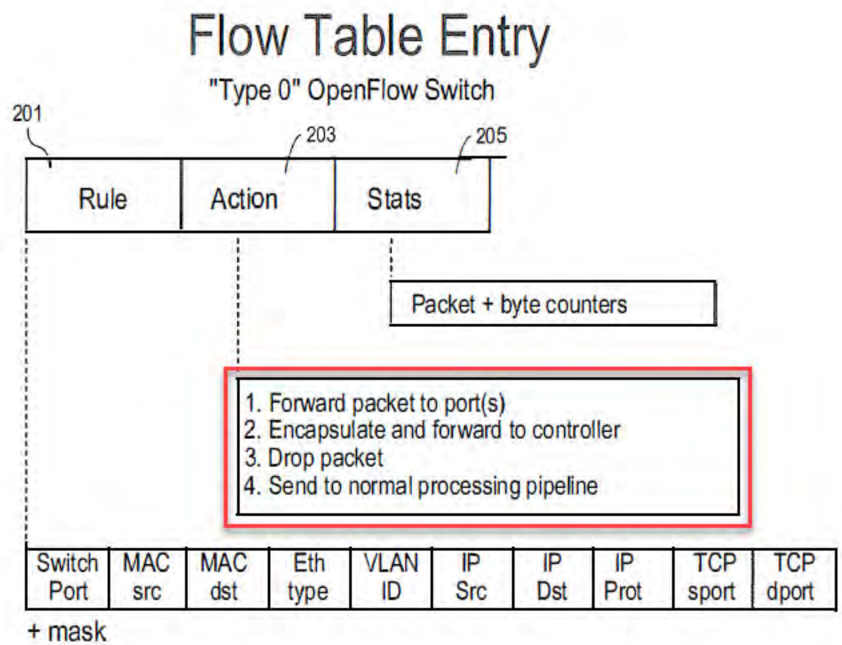
No.	’111 Patent Claim 2	Kempf
		executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0052] (“Actions allow manipulating of tag stacks by pushing and popping labels. Combined with multiple tables, VLAN or MPLS label stacks can be processed by matching one label per table. FIG. 7 is a flow chart of one embodiment of a header parsing process. The parsing process matches a packet header by initializing a set of match fields (Block 701) and checking for the presence of a set of different header types. The process checks for a VLAN tag (Block 703). If the VLAN tag is present, then there are a series of processing steps for the VLAN tag (Blocks 705-707). If the switch supports MPLS (Block 709), then there are a series of steps for detecting and processing the MPLS header information (Blocks 711-715). If the switch supports address resolution protocol (ARP), then there are a series of steps for processing the ARP header (Blocks 719 and 721). If the packet has an IP header (Block 723), then there are a series of steps for processing the IP header (Blocks 725-733). This process is performed for each received packet.”) Kempf at [0055] (“OpenFlow 1.1 can be utilized to support virtual ports. A virtual port, as used herein, is an "action block" that performs some kind of processing action other than simply forwarding the packet out to a network connection like physi-cal ports do. Examples of a few built-in virtual ports include: ALL, which forwards the port out all ports except for the ingress port and any ports that are marked "Do Not Forward;" CONTROLLER, which encapsulates the packet and sends it to the controller; TABLE, which inserts the packet into the packet processing pipeline by submitting it to the first flow table, this action is only valid in the action set of a packet-out message; and IN_PORT, which sends the packet out the ingress port. In other embodiments, there can also be switched-defined virtual ports.”)

No.	’111 Patent Claim 2	Kempf
2[b]	upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller.	Kempf discloses upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller. For example, Kempf discloses actions associated with a flow match including dropping packets from being sent any further. Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509).

No.	'111 Patent Claim 2	Kempf
		If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.") Kempf at Figure 2 (annotation added)  FIG. 2

No.	’111 Patent Claim 3	Kempf
3[a]	The method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction, and	Kempf discloses the method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction. *See supra* at 2(a).
3[b]	upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller.	Kempf discloses upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller. For example, Kempf discloses actions associated with a flow match including an action to forward the packet to the destination device and to the controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, cou upon receiving by the network node the ‘mirror' instruction and responsive to the packet satisfying the criterion, method further comprising sending the packet, by the network node, to the second entity and to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”)

No.	'111 Patent Claim 3	Kempf
		Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.") Kempf at [0106] ("This encapsulates the packet and sends it to the OpenFlow controller.") Kempf at Figure 2 (annotation added)

No.	'111 Patent Claim 3	Kempf
		 **FIG. 2** Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Kempf in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 3(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Chua discloses a mirror program in response to an indication based on the packet header in which the network devices mirror copies of the packets of the packet flow

No.	’111 Patent Claim 3	Kempf
		to a second service device while forwarding the packets of the packet flow to the destination of the packet flow. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header”) Chua at 16:23-44 (“More particularly, control unit 130 may configure any of service devices 116 to send data representative of a particular event to SDN controller 112, and control unit 130 may auto-matically reprogram one or more network devices of SDN 106 in response to such data. For example, security monitor-ing applications of service devices 116 may determine that a specific source port, destination port, source IP address, des-tination IP address, or the like should be acted upon. Alter-natively, security monitoring applications may determine that, due to content or deep packet inspection, a specific type of traffic is malicious and should be blocked. In either case, the corresponding one of service devices 116 may send a message to SDN controller 112 representative of these deter-minations. As yet another example, a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics. SDN controller 112 may respond by programming

No.	’111 Patent Claim 3	Kempf
		network devices of SDN 106 to perform a programmed action, such as allowing corresponding traffic, blocking corresponding traf-fic, mirroring corresponding traffic, redirecting correspond-ing traffic.”) Chua at 28:7-32 (“In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data, forward packets of the packet flow to a destination of the packet flow, forward packets of malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.”) As another example, Swenson discloses a counting mode instructed by the network controller to the steering device for monitoring and optimizing, in which the steering device forwards the packet flow to the user device/origin server and at the same time, sending the packet flow to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140

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		interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0059] ("In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The

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		flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0064] ("Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net-work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.") Swenson at [0071] ("After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.") Swenson at [0072] ("In one embodiment, if the video optimizer 150 failed to retrieve user requested video file from the origin server 160, the video optimizer 150 appends a "do not

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		transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 624, which is intercepted by the steering device 130 only. The steering device 130 forwards the video to the user device 110 and at the same time reports the flow size to the network controller 140 for monitoring purpose.”)

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4[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Kempf discloses the method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction. *See supra* at 2(a).
4[b]	upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller;	Kempf discloses upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller. For example, Kempf discloses actions associated with a flow match including an action for further processing and sending the packet to the controller. Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To

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		define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.") Kempf at [0050] ("FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.") Kempf at [0051] ("FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or

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		match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0055] (“OpenFlow 1.1 can be utilized to support virtual ports. A virtual port, as used herein, is an "action block" that performs some kind of processing action other than simply forwarding the packet out to a network connection like physi-cal ports do. Examples of a few built-in virtual ports include: ALL, which forwards the port out all ports except for the ingress port and any ports that are marked "Do Not Forward;" CONTROLLER, which encapsulates the packet and sends it to the controller; TABLE, which inserts the packet into the packet processing pipeline by submitting it to the first flow table, this action is only valid in the action set of a packet-out message; and IN_PORT, which sends the packet out the ingress port. In other embodiments, there can also be switched-defined virtual ports.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”)

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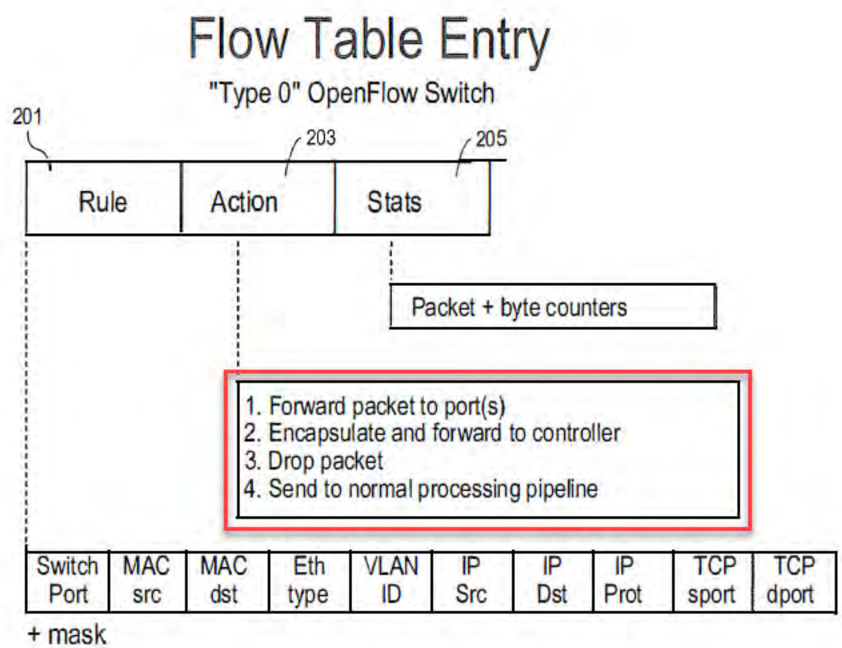
		Kempf at [0106] ("This encapsulates the packet and sends it to the OpenFlow controller.") Kempf at Figure 2 (annotation added)  FIG. 2
4[c]	responsive to receiving the packet, analyzing the packet, by the controller;	Kempf discloses responsive to receiving the packet, analyzing the packet, by the controller. For example, Kempf discloses further processing by the controller in response to a packet flow match indicating that a packet needs encapsulation or arrives encapsulated with

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		nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet). Kempf at [0037] (“The EPC architecture also contains little flexibility for specialized treatment of user flows. Though the architec-ture does provide support for establishing quality of service (QoS), other sorts of data management are not available. For example services involving middle boxes, such as specialized deep packet inspection or interaction with local data caching and processing resources that might be utilized for transcod-ing or augmented reality applications, is difficult to support with the current EPC architecture. Almost all such applica-tions require the packet flows to exit through the PDN Gate-way, thereby being de-tunnelled from GTP, and to be pro-cessed within the wired network.”) Kempf at [0074] (“The operation of the EPC cloud computer system as follows. The UE 1317, E-NodeB 1317, S-GW-C 1307, and P-GW-C signal 1307 to the MME, PCRF, and HSS 1307 using the standard EPC protocols, to establish, modify, and delete bearers and GTP tunnels. This signaling triggers pro-cedure calls with the OpenFlow controller to modify the routing in the EPC as requested. The OpenFlow controller configures the standard OpenFlow switches, the Openflow S-GW-D 1315, and P-GW-D 1311 with flow rules and actions to enable the routing requested by the control plane entities. Details of this configuration are described in further detail herein below.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0084] (“GTP virtual ports are configured from the Open-Flow controller using a configuration protocol. The details of the configuration protocol are switch-dependent. The con-figuration protocol must support messages that perform following functions: allow the controller to query for and return an indication whether the switch supports GTP fast path

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		virtual ports and what virtual port numbers are used for fast path and slow path GTP-U processing; and allow the controller to instantiate a GTP-U fast path virtual port within a switch datapath for use in the OpenFlow table set-output-port action. The configuration command must be run in a transaction so that, when the results of the action are reported back to the controller, either a GTP-U fast path virtual port for the requested datapath has been instantiated or an error has returned indicating why the request could not be honored. The command also allows the OpenFlow controller to bind a GTP-U virtual port to a physical port. For decapsulation virtual ports, the physical port is an input port. For encapsu-lation virtual ports, the physical port is an output port.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0104] (“In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.”) Kempf at [0106] (“This encapsulates the packet and sends it to the OpenFlow controller.”)

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4[d]	sending the packet, by the controller, to the network node; and	Kempf discloses sending the packet, by the controller, to the network node. For example, Kempf discloses the controller sending the packet back through the intended datapath via the network element. A person of ordinary skill would understand that the packet, once sent to the controller for further processing, is then sent back to the network element to be forwarded to its originally intended destination. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, sending the packet, by the controller, to the network node would have been obvious to a person having ordinary skill in the art, as explained below. Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0055] (“OpenFlow 1.1 can be utilized to support virtual ports. A virtual port, as used herein, is an "action block" that performs some kind of processing action other than simply forwarding the packet out to a network connection like physi-cal ports do. Examples of a few built-in virtual ports include: ALL, which forwards the port out all ports except for the ingress port and any ports that are marked "Do Not Forward;" CONTROLLER, which encapsulates the packet and sends it to the controller; TABLE, which inserts the packet into the packet processing pipeline by submitting it to the first flow table, this action is only valid in the action set of a packet-out message; and IN_PORT, which sends the packet out the ingress port. In other embodiments, there can also be switched-defined virtual ports.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Kempf in combination with (1) the knowledge of a person of ordinary skill in the art, alone

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		or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4(d) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses sending the packet, for example a video or image, back to the steering device after the network controller analyzes the packet and updates flow statistics. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media

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		requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0057] (“The Internet content adaption protocol is a light-weight protocol aimed at executing a simple remote proce-dure call on HTTP messages. ICAP leverages edge-based devices to help deliver value-added services using transparent HTTP proxy caches. Content adaptation refers to performing the particular value added service, such as content manipula-tion or other processing, for the associated HTTP client request/response. ICAP clients pass HTTP messages to ICAP servers for transformation or other processing. In tum, the ICAP server executes its transformation service on the HTTP messages and sends back responses to the ICAP client. At the core of this process is a cache that can proxy all client trans-actions and process them through ICAP servers, which may focus on specific functions, such as ad insertion, virus scan-ning, content translation, language translation, or content fil-tering. ICAP servers, such as those utilized by the network controller 140, handle these tasks to off-load value-added services from network devices including an ICAP client, such as the steering device 130. By offloading value added services from the steering device 130, processing infrastructure (e.g., optimization services and network controllers) may be scaled independent from the steering devices handling raw HTTP throughput.”)

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		Swenson at [0059] ("In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0060] ("If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.") Swenson at [0071] ("After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends

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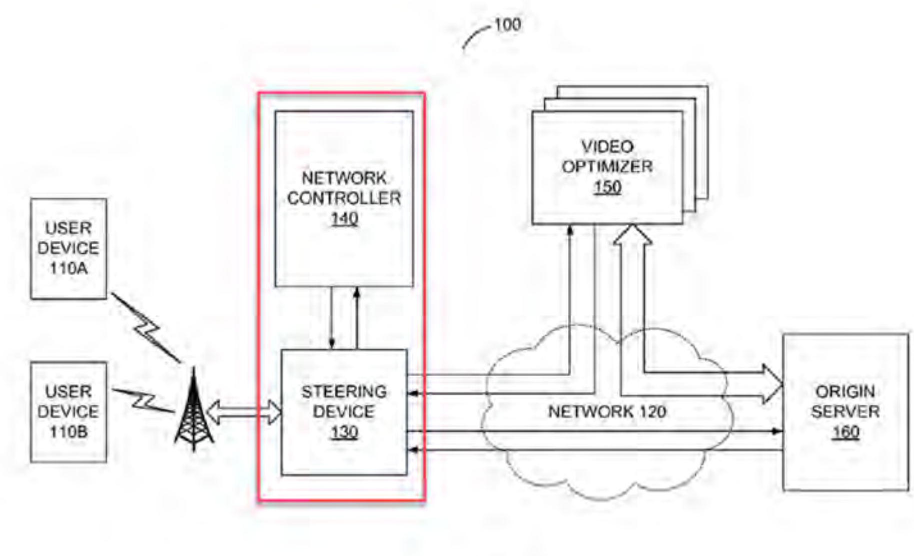
		ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.") Swenson at Figure 1 (annotation added)  FIG. 1
4[e]	responsive to receiving the packet, sending the packet, by the network node, to the second entity.	Kempf discloses responsive to receiving the packet, sending the packet, by the network node, to the second entity. For example, Kempf discloses sending the packet back through the intended datapath via the network element. A person of ordinary skill would understand that the packet, once sent to the controller for further processing, is then sent back to the network element to be forwarded to its originally intended destination. Thus, at least under the apparent claim

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		scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, responsive to receiving the packet, sending the packet, by the network node, to the second entit would have been obvious to a person having ordinary skill in the art, as explained below. Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.") Kempf at [0055] ("OpenFlow 1.1 can be utilized to support virtual ports. A virtual port, as used herein, is an "action block" that performs some kind of processing action other than simply forwarding the packet out to a network connection like physi-cal ports do. Examples of a few built-in virtual ports include: ALL, which forwards the port out all ports except for the ingress port and any ports that are marked "Do Not Forward;" CONTROLLER, which encapsulates the packet and sends it to the controller; TABLE, which inserts the packet into the packet processing pipeline by submitting it to the first flow table, this action is only valid in the action set of a packet-out message; and IN_PORT, which sends the packet out the ingress port. In other embodiments, there can also be switched-defined virtual ports.") Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, the VMware NSX System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4(e) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example.

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		For example, Swenson discloses sending the packet, for example a video or image, back to the steering device after the network controller analyzes the packet and updates flow statistics, i.e., sending the packet, by the controller, to the network node. Swenson further discloses the steering device, upon having the packet returned to it, i.e., responsive to receiving the packet, transmitting the packet to the destination entity, for example, the user device or origin server, i.e., sending the packet, by the network node, to the second entity. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic

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		data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0057] (“The Internet content adaption protocol is a light-weight protocol aimed at executing a simple remote proce-dure call on HTTP messages. ICAP leverages edge-based devices to help deliver value-added services using transparent HTTP proxy caches. Content adaptation refers to performing the particular value added service, such as content manipula-tion or other processing, for the associated HTTP client request/response. ICAP clients pass HTTP messages to ICAP servers for transformation or other processing. In tum, the ICAP server executes its transformation service on the HTTP messages and sends back responses to the ICAP client. At the core of this process is a cache that can proxy all client trans-actions and process them through ICAP servers, which may focus on specific functions, such as ad insertion, virus scan-ning, content translation, language translation, or content fil-tering. ICAP servers, such as those utilized by the network controller 140, handle these tasks to off-load value-added services from network devices including an ICAP client, such as the steering device 130. By offloading value added services from the steering device 130, processing infrastructure (e.g., optimization services and network controllers) may be scaled independent from the steering devices handling raw HTTP throughput.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and

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		a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized

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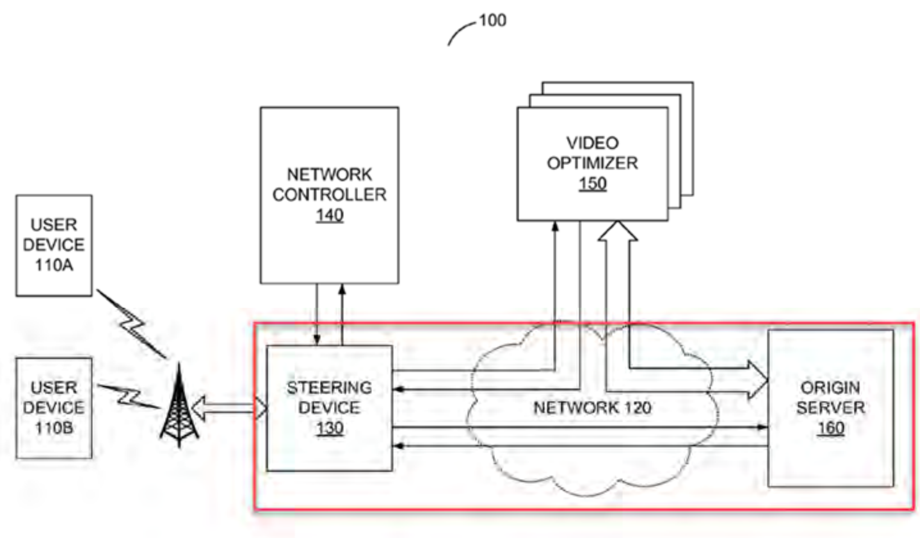
		video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)  FIG. 1

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5	The method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the	Kempf discloses the method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller. For example, Kempf discloses sending in response to a flow table match, the packet or packet field to the controller by the network element. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, further comprising responsive to

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	network node, to the controller.	the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 1. Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.") Kempf at [0046] ("A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.")

No.	’111 Patent Claim 5	Kempf
		Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0055] (“OpenFlow 1.1 can be utilized to support virtual ports. A virtual port, as used herein, is an "action block" that performs some kind of processing action other than simply forwarding the packet out to a network connection like physi-cal ports do. Examples of a few built-in virtual ports include: ALL, which forwards the port out all ports except for the ingress port and any ports that are marked "Do Not Forward;" CONTROLLER, which encapsulates the packet and sends it to the controller; TABLE, which inserts the packet into the packet processing pipeline by submitting it to the first flow table, this action is only valid in the action set of a packet-out message; and IN_PORT, which sends the packet out the ingress port. In other embodiments, there can also be switched-defined virtual ports.”)

No.	’111 Patent Claim 5	Kempf
		Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.) Kempf at [0106] (“This encapsulates the packet and sends it to the OpenFlow controller.”) Kempf at [0133] (“Before returning a result to the PGW-C from the GTP routing update RPC, the OpenFlow controller issues a sequence of OpenFlow messages to the appropriate data plane gateway entity. In the example embodiment, the sequence begins with an OFP _BARRIER_REQUEST to ensure that there are no pending messages that might influ-ence processing of the following messages. Then an OFPT_ FLOW _MOD message is issued, including the of_match structure with GTP extension as the match field and OFPFC_ ADD as the command field. The message specifies actions and instructions, as described above, to establish a flow route for the GTP tunnel that encapsulates and decapsulates the packets through the appropriate virtual port. In addition, immediately following the OFPT_FLOW _MOD message, the OpenFlow controller issues an GTP _ADD_TEID_ TABLE_ENTRY message to the gateways containing the TEID hash table entries for the encapsulation virtual port. As described above, the two OpenFlow messages are followed by an

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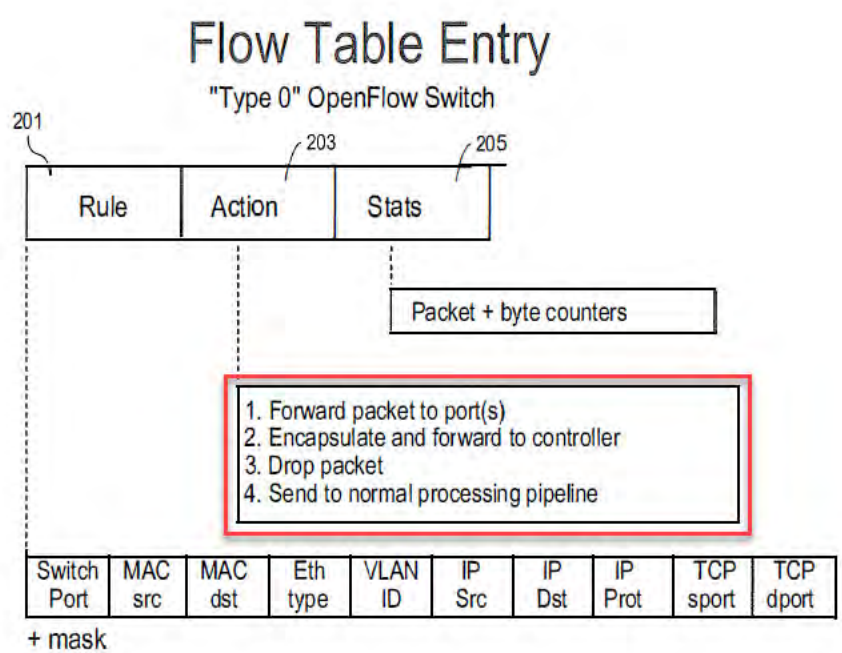
		OFPT_BARRIER_REQUEST message to force the gateways to process the flow route and TEID hash table update before proceeding.”) Kempf at Figure 2 (annotation added)  FIG. 2 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Kempf in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 5 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example.

No.	’111 Patent Claim 5	Kempf
		For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index. Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.”) Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0120] (“The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled

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		packets, and other information avail-able from the sFlow data stream that may be important. For example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.”) Copeland at [0126]-[0129] (“If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”) Copeland at [0144] (“Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number

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		noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”) Copeland at [0159]-[0162] (“A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and: (a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”)

No.	’111 Patent Claim 6	Kempf
6	The method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory.	Kempf discloses the method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory. For example, Kempf discloses storing the packets and packet fields in the controller, and further updating rules based on that stored information. A person of ordinary skill in the art would understand that updating the rules sent to network elements by the controller is based on storing the packet information informing the rule update. *See supra* at Claim 5.

No.	’111 Patent Claim 6	Kempf
		Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0065] (“A cloud computing system can be composed of any number of computing devices having any range of capabili-ties (e.g., processing power or storage capacity). The cloud computing system can be a private or public system. The computing devices can be in communication with one another across any communication system or network. A cloud com-puting system can support a single cloud or service or any number of discrete clouds or services. Services, applications and similar programs can be virtualized or executed as stan-dard code. In one embodiment, cloud computing systems can support web services applications. Web services applications consist of a load balancing front end that dispatches requests to a pool of Web servers. The requests originate from appli-cations on remote machines on the Internet and therefore the security and privacy requirements are much looser than for applications in a private corporate network.”) Kempf at [0134] (“Prior to returning from the GTP routing update RPC, the OpenFlow controller also issues GTP flow routing updates to any GTP extended OpenFlow Switches (GxOFSs) that need to be involved in customized GTP flow routing. The messages in these updates consist of an OFP _BARRIER_ REQUEST followed by an OFPT_FLOW _MOD message containing the ofp_match structure with GTP extension for the new GTP flow as the match field and OFPFC_ADD as the command field, and the actions and instructions described above for customized GTP flow routing. A final OFP _BAR-RIER_ REQUEST

No.	’111 Patent Claim 6	Kempf
		forces the switch to process the change before responding. The flow routes on any GxOFSs are installed after installing the GTP tunnel endpoint route on the SGW-D and prior to installing the GTP tunnel endpoint route on the PGW-D, as illustrated in FIG. 19. The OpenFlow controller does not respond to the PGW-C RPC until all flow routing updates have been accomplished.”)

No.	’111 Patent Claim 7	Kempf
7	The method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.	Kempf discloses the method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller. For example, Kempf discloses sending in response to a flow table match a packet field to the controller by the network element. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, further comprising responsive to the packet satisfying the criterion and to instruction, sending a portion of the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 5. Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”)

No.	’111 Patent Claim 7	Kempf
		Kempf at [0055] (“OpenFlow 1.1 can be utilized to support virtual ports. A virtual port, as used herein, is an "action block" that performs some kind of processing action other than simply forwarding the packet out to a network connection like physi-cal ports do. Examples of a few built-in virtual ports include: ALL, which forwards the port out all ports except for the ingress port and any ports that are marked "Do Not Forward;" CONTROLLER, which encapsulates the packet and sends it to the controller; TABLE, which inserts the packet into the packet processing pipeline by submitting it to the first flow table, this action is only valid in the action set of a packet-out message; and IN_PORT, which sends the packet out the ingress port. In other embodiments, there can also be switched-defined virtual ports.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers.

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		(i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes

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		match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0106] (“This encapsulates the packet and sends it to the OpenFlow controller.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Kempf in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 7 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index. Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.”)

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		Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0120] (“The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled packets, and other information avail-able from the sFlow data stream that may be important. For example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.”) Copeland at [0126]-[0129] (“If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from

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		that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).") Copeland at [0144] ("Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."") Copeland at [0150] ("A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.") Copeland at [0159]-[0162] ("A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and:

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		(a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).")

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8[a]	The method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes, and	Kempf discloses the method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes. For example, Kempf discloses consecutive bytes of a packet header field. *See supra* at Claim 7. Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0- Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a

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		result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0087] ("In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.") Kempf at [0091] ("When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.")

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		Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”)

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8[b]	wherein the instruction comprises identification of the consecutive bytes in the packet.	Kempf discloses wherein the instruction comprises identification of the consecutive bytes in the packet. For example, Kempf discloses rules in which the flow table includes matching to the consecutive bytes of a packet header. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and

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		by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.") Kempf at [0091] ("When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.") Kempf at [0092] ("In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255)

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		while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”)

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9	The method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller.	Kempf discloses the method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller. For example, Kempf discloses further processing by the controller in response a packet flow match indicating a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet).

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		See supra at Claim 5. Kempf at [0037] (“The EPC architecture also contains little flexibility for specialized treatment of user flows. Though the architec-ture does provide support for establishing quality of service (QoS), other sorts of data management are not available. For example services involving middle boxes, such as specialized deep packet inspection or interaction with local data caching and processing resources that might be utilized for transcod-ing or augmented reality applications, is difficult to support with the current EPC architecture. Almost all such applica-tions require the packet flows to exit through the PDN Gate-way, thereby being de-tunnelled from GTP, and to be pro-cessed within the wired network.”) Kempf at [0074] (“The operation of the EPC cloud computer system as follows. The UE 1317, E-NodeB 1317, S-GW-C 1307, and P-GW-C signal 1307 to the MME, PCRF, and HSS 1307 using the standard EPC protocols, to establish, modify, and delete bearers and GTP tunnels. This signaling triggers pro-cedure calls with the OpenFlow controller to modify the routing in the EPC as requested. The OpenFlow controller configures the standard OpenFlow switches, the Openflow S-GW-D 1315, and P-GW-D 1311 with flow rules and actions to enable the routing requested by the control plane entities. Details of this configuration are described in further detail herein below.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0084] (“GTP virtual ports are configured from the Open-Flow controller using a configuration protocol. The details of the configuration protocol are switch-dependent. The con-figuration protocol must support messages that perform following functions: allow the controller to query for and return an indication whether the switch supports GTP fast path virtual ports and what virtual port numbers are used for fast path and slow path GTP-U

No.	'111 Patent Claim 9	Kempf
		processing; and allow the controller to instantiate a GTP-U fast path virtual port within a switch datapath for use in the OpenFlow table set-output-port action. The configuration command must be run in a transaction so that, when the results of the action are reported back to the controller, either a GTP-U fast path virtual port for the requested datapath has been instantiated or an error has returned indicating why the request could not be honored. The command also allows the OpenFlow controller to bind a GTP-U virtual port to a physical port. For decapsulation virtual ports, the physical port is an input port. For encapsu-lation virtual ports, the physical port is an output port.") Kempf at [0091] ("When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.") Kempf at [0104] ("In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.") Kempf at [0106] ("This encapsulates the packet and sends it to the OpenFlow controller.")

No.	'111 Patent Claim 12	Kempf
12	The method according to claim 9, wherein the analyzing comprises applying security or data analytic application.	Kempf discloses the method according to claim 9, wherein the analyzing comprises applying security or data analytic application. For example, Kempf discloses packet processing for security purposes. *See supra* at Claim 9. Kempf at [0037] ("The EPC architecture also contains little flexibility for specialized treatment of user flows. Though the architec-ture does provide support for establishing quality of service (QoS), other sorts of data management are not available. For example services involving middle boxes, such as specialized deep packet inspection or interaction with local data caching and processing resources that might be utilized for transcod-ing or augmented reality applications, is difficult to support with the current EPC architecture. Almost all such applica-tions require the packet flows to exit through the PDN Gate-way, thereby being de-tunnelled from GTP, and to be pro-cessed within the wired network.") Kempf at [0065] ("A cloud computing system can be composed of any number of computing devices having any range of capabili-ties (e.g., processing power or storage capacity). The cloud computing system can be a private or public system. The computing devices can be in communication with one another across any communication system or network. A cloud com-puting system can support a single cloud or service or any number of discrete clouds or services. Services, applications and similar programs can be virtualized or executed as stan-dard code. In one embodiment, cloud computing systems can support web services applications. Web services applications consist of a load balancing front end that dispatches requests to a pool of Web servers. The requests originate from appli-cations on remote machines on the Internet and therefore the security and privacy requirements are much looser than for applications in a private corporate network.") Kempf at [0066] ("Cloud computer systems can also support secure multi-tenancy, in which the cloud computer system provider offers virtual private network (VPN)-like connections between the client's distributed office networks outside the cloud and a VPN within the cloud computing system. This allows the client's applications within the cloud computing system to operate in a network environment that resembles a corporate WAN. For private data centers, in which services are only offered to customers within the corporation owning

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		the data center, the security and privacy requirements for multi-tenancy are relaxed. But for public data centers, the cloud operator must ensure that the traffic from multiple tenants is isolated and there is no possibility for traffic from one client to reach another client network.") Kempf at [0070] ("The cloud manager 1303 monitors the central pro-cessor unit (CPU) utilization of the EPC control plane entities 1307 and the control plane traffic between the EPC control plane entities 1307 within the cloud. It also monitors the control plane traffic between the end user devices (UEs) and E-NodeBs, which do not have control plane entities in the cloud computing system 1301, and the EPC control plane entities 1307. If the EPC control plane entities 1307 begin to exhibit signs of overloading, such as the utilization of too much CPU time, or the queueing up of too much traffic to be processed, the overloaded control plane entity 1307 requests that the cloud manager 1303 start up a new VM to handle the load. Additionally, the EPC control plane entities 1307 them-selves can issue event notifications to the cloud manager 1303 if they detect internally that they are beginning to experience overloading.") Kempf at [0074] ("The operation of the EPC cloud computer system as follows. The UE 1317, E-NodeB 1317, S-GW-C 1307, and P-GW-C signal 1307 to the MME, PCRF, and HSS 1307 using the standard EPC protocols, to establish, modify, and delete bearers and GTP tunnels. This signaling triggers pro-cedure calls with the OpenFlow controller to modify the routing in the EPC as requested. The OpenFlow controller configures the standard OpenFlow switches, the Openflow S-GW-D 1315, and P-GW-D 1311 with flow rules and actions to enable the routing requested by the control plane entities. Details of this configuration are described in further detail herein below.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.")

No.	’111 Patent Claim 12	Kempf
		Kempf at [0084] (“GTP virtual ports are configured from the Open-Flow controller using a configuration protocol. The details of the configuration protocol are switch-dependent. The con-figuration protocol must support messages that perform following functions: allow the controller to query for and return an indication whether the switch supports GTP fast path virtual ports and what virtual port numbers are used for fast path and slow path GTP-U processing; and allow the controller to instantiate a GTP-U fast path virtual port within a switch datapath for use in the OpenFlow table set-output -port action. The configuration command must be run in a transaction so that, when the results of the action are reported back to the controller, either a GTP-U fast path virtual port for the requested datapath has been instantiated or an error has returned indicating why the request could not be honored. The command also allows the OpenFlow controller to bind a GTP-U virtual port to a physical port. For decapsulation virtual ports, the physical port is an input port. For encapsu-lation virtual ports, the physical port is an output port.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0104] (“In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination

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		port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.") Kempf at [0106] ("This encapsulates the packet and sends it to the OpenFlow controller.")

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13	The method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality.	Kempf discloses the method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality. For example, Kempf discloses packet processing for security purposes, i.e., wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality. A person of ordinary skill in the art would understand security monitoring of packets can comprise use of a firewall or intrusion detection functionality. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 9. Kempf at [0037] ("The EPC architecture also contains little flexibility for specialized treatment of user flows. Though the architec-ture does provide support for establishing quality of service (QoS), other sorts of data management are not available. For example services involving middle boxes, such as specialized deep packet inspection or interaction with local data caching and processing resources that might be utilized for transcod-ing or augmented reality applications, is difficult to support with the current EPC architecture. Almost all such applica-tions require the packet flows to exit through the PDN Gate-way, thereby being de-tunnelled from GTP, and to be pro-cessed within the wired network.")

No.	’111 Patent Claim 13	Kempf
		Kempf at [0065] (“A cloud computing system can be composed of any number of computing devices having any range of capabili-ties (e.g., processing power or storage capacity). The cloud computing system can be a private or public system. The computing devices can be in communication with one another across any communication system or network. A cloud com-puting system can support a single cloud or service or any number of discrete clouds or services. Services, applications and similar programs can be virtualized or executed as stan-dard code. In one embodiment, cloud computing systems can support web services applications. Web services applications consist of a load balancing front end that dispatches requests to a pool of Web servers. The requests originate from appli-cations on remote machines on the Internet and therefore the security and privacy requirements are much looser than for applications in a private corporate network.”) Kempf at [0066] (“Cloud computer systems can also support secure multi-tenancy, in which the cloud computer system provider offers virtual private network (VPN)-like connections between the client's distributed office networks outside the cloud and a VPN within the cloud computing system. This allows the client's applications within the cloud computing system to operate in a network environment that resembles a corporate WAN. For private data centers, in which services are only offered to customers within the corporation owning the data center, the security and privacy requirements for multi-tenancy are relaxed. But for public data centers, the cloud operator must ensure that the traffic from multiple tenants is isolated and there is no possibility for traffic from one client to reach another client network.”) Kempf at [0070] (“The cloud manager 1303 monitors the central pro-cessor unit (CPU) utilization of the EPC control plane entities 1307 and the control plane traffic between the EPC control plane entities 1307 within the cloud. It also monitors the control plane traffic between the end user devices (UEs) and E-NodeBs, which do not have control plane entities in the cloud computing system 1301, and the EPC control plane entities 1307. If the EPC control plane entities 1307 begin to exhibit signs of overloading, such as the utilization of too much CPU time, or the queueing up of too much traffic to be processed, the overloaded control plane entity 1307 requests that the cloud manager 1303 start up a new VM to handle the load. Additionally, the EPC control plane entities 1307 them-selves can issue event notifications to the cloud manager 1303 if they detect internally that they are beginning to experience overloading.”)

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		Kempf at [0074] (“The operation of the EPC cloud computer system as follows. The UE 1317, E-NodeB 1317, S-GW-C 1307, and P-GW-C signal 1307 to the MME, PCRF, and HSS 1307 using the standard EPC protocols, to establish, modify, and delete bearers and GTP tunnels. This signaling triggers pro-cedure calls with the OpenFlow controller to modify the routing in the EPC as requested. The OpenFlow controller configures the standard OpenFlow switches, the Openflow S-GW-D 1315, and P-GW-D 1311 with flow rules and actions to enable the routing requested by the control plane entities. Details of this configuration are described in further detail herein below.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0084] (“GTP virtual ports are configured from the Open-Flow controller using a configuration protocol. The details of the configuration protocol are switch-dependent. The con-figuration protocol must support messages that perform following functions: allow the controller to query for and return an indication whether the switch supports GTP fast path virtual ports and what virtual port numbers are used for fast path and slow path GTP-U processing; and allow the controller to instantiate a GTP-U fast path virtual port within a switch datapath for use in the OpenFlow table set-output-port action. The configuration command must be run in a transaction so that, when the results of the action are reported back to the controller, either a GTP-U fast path virtual port for the requested datapath has been instantiated or an error has returned indicating why the request could not be honored. The command also allows the OpenFlow controller to bind a GTP-U virtual port to a physical port. For decapsulation virtual ports, the physical port is an input port. For encapsu-lation virtual ports, the physical port is an output port.”)

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		Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0104] (“In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.”) Kempf at [0106] (“This encapsulates the packet and sends it to the OpenFlow controller.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Kempf in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 13 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses analysis by the intrusion detection engine on the monitoring appliance to detect communication intruders and suspicious activity. The monitoring appliance may also work in coordination with a firewall.

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		Copeland at [0065] ("The intrusion detection engine 155 analyzes the flow data 160 to determine if the flow appears to be legitimate traffic or possible suspicious activity. Flows with suspicious activity are assigned a predetermined concern index (CI) value based upon a heuristically predetermined assessment of the significance of the threat of the particular traffic or flow or suspicious activity. The flow concern index values have been derived heuristically from extensive net-work traffic analysis. Concern index values are associated with particular hosts and stored in the host data structure 166 (FIG. 1). Exemplary concern index values for various exemplary flow-based events and other types of events are illustrated in connection with FIGS. 6 and 7.") Copeland at [0067] ("The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.") Copeland at [0068] ("Those skilled in the art understand that many networks utilize firewalls to limit unwanted network traffic. A monitoring appliance 150 can be connected before a firewall to detect intrusions directed at the network. Con-versely, the monitoring appliance 150 may be installed behind a firewall to detect intrusions that bypass the firewall. Some systems install two firewalls with web and e-mails servers in the so-called "demilitarized zone" or "DMZ" between firewalls. One common placement of the monitor-ing appliance 150 is in this demilitarized zone. Of course, those skilled in the art will appreciate that the flow-based intrusion detection system 155 or appliance 150 can operate without the existence of any firewalls.") Copeland at [0069] ("It will now be appreciated that the disclosed meth-odology of intrusion detection is accomplished at least in part by analyzing communication flows to determine if such communications have the flow characteristics of probes or attacks. By analyzing communications for abnormal flow characteristics, attacks can be determined without the need for resource-intensive packet data analysis. A flow can be determined from the packets 101 that are transmitted between two hosts utilizing a single service. The

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		addresses and port numbers of communications are easily discerned by analysis of the header information in a datagram.") Copeland at [0112] ("FIG. 5 illustrates a logical software architecture of a flow-based intrusion detection engine 155 constructed in accordance with an embodiment of the present invention. As will be understood by those skilled in the art, the system is constructed utilizing Internet-enabled computer systems with computer programs designed to carry out the functions described herein. Preferably, the various computing func-tions are implemented as different but related processes known as "threads" which executed concurrently on modern day multi-threaded, multitasking computer systems.") Copeland at Figure 5

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		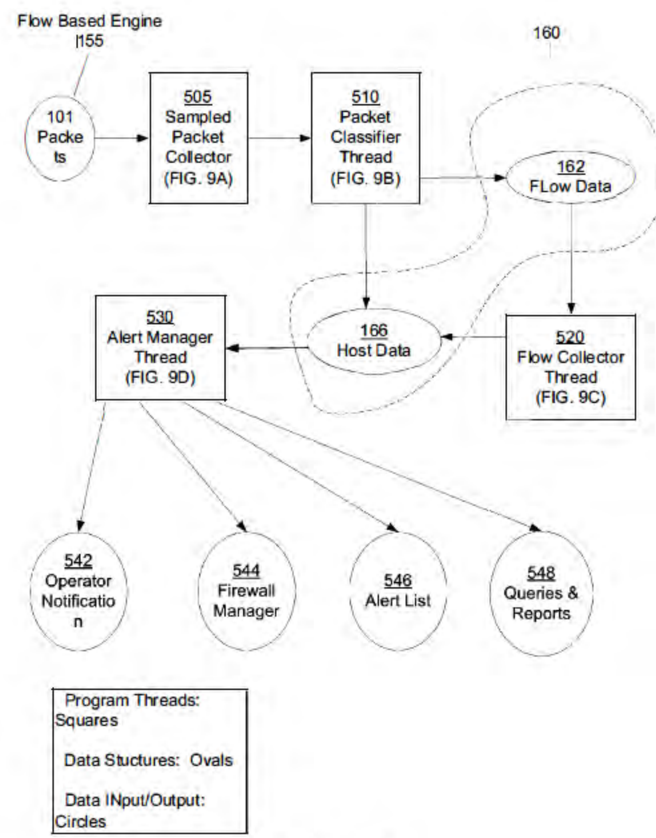 FIG. 5 Copeland at [0149] ("The alert manager 530 also looks for hosts whose CI or traffic (byte rate) exceeds preset alarm thresholds and which have not been handled on previous runs. The new alarm conditions can cause immediate operator notification by an operator notification process 542. These conditions can be highlighted on the user interface, and cause SNMP trap messages to be sent to a network monitor such as HP Openview, and/or email messages to the network adminis-trator that in turn may cause messages to be sent to beepers or cell phones. Messages can also be sent to cause automated devices such as a firewall manager 544 to drop packets going to or from an offending host. It will thus be

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		appreciated that the present invention advantageously operates in conjunc-tion with firewalls and other network security devices and processes to provide additional protection for an entity's computer network and computer resources.”) Copeland at [0177] (“If an alarm threshold has been exceeded, the "Yes" branch of step 975 is followed to step 976. In step 976, the alert manager thread generates certain predetermined signals designed to drawn the attention of a system administrator or other interested person. The alert manager 530 looks for hosts whose CI or traffic (byte rate) exceeds preset alarm thresholds and have not been handled on previous runs. The new alarm conditions can cause immediate operator notifi-cation. These conditions can be highlighted on the user interface, and cause SNMP trap messages to be sent to a network monitor such as HP Openview, and/or email mes-sages to the network administrator that in turn may cause messages to be sent to beepers or cell phones. Messages can also be sent to cause automated devices such as a firewall manager to drop packets going to or from an offending host. Step 976 is followed by step 972, in which the thread 530 awaits the requisite amount of time.”) For example, Chua ‘877 discloses security determinations and analysis that involve the use of firewalls or intrusion detection services. Chua ‘877 at 31:48-59 (“In some examples, SDN controller 112 further performs deep packet inspection (DPI) on packets from client device 102 (402). For example, SDN controller 112 may inspect one or more preliminary packets of packet flows originating from or directed to client device 102, and after determining that the packet flows are not malicious (after a predetermined number of packets), stop inspecting the packet flows. Alternatively, SDN controller 112 may program network devices of SDN 106 to forward a predetermined number of packets of the packet flows originating from or destined for client device 102 through a deep packet inspection service device, which may correspond to one of service devices 116.”) Chua ‘877 at 25:32-52 (“In the example of FIG. 5, SDN controller 112 determines zones for packet flows through the network devices forming the SDN (304). The zones generally correspond to packet flows, that is, paths through the SDN followed by particular packets.

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		SDN controller 112 may store data defining the zones in the data model discussed above. The data defining the zones may specify entities (e.g., users, devices, or the like) that have access to each zone. Thus, SDN controller 112 may program network devices of the SDN such that entities that are not authorized to access a particular zone are prevented from accessing the zone. SDN controller 112 may specify a zone using packet header field values, such as a source port, a destination port, a source IP address, a destination IP address, a virtual local area network (VLAN) tag, multiprotocol label switching (MPLS) labels, a packet protocol, and/or an IP subnet. In some cases, SDN controller 112 may specify whether a corresponding packet flow for a zone is suspect or malicious and construct the zone such that packets of the packet flow are prevented from reaching an intended destination. As noted above, zones may be ordered based on priority values when overlap occurs.”) Chua ‘877 at 25:53-65 (“Furthermore, SDN controller 112 determines trusted packet flows (306). For example, SDN controller 112 may determine that certain packet flows can be trusted based on security controls, and that other packet flows cannot be trusted based on the security controls. That is, SDN controller 112 may determine whether a packet flow can be trusted based on values of packet headers for the packet flows, e.g., values of headers at various layers of the OSI model (e.g., any or all of layers 2-7 of the OSI model). In some examples, SDN controller 112 may omit any or all of steps 302, 304, and 306, e.g., omitting any or all of determination of service devices, determination of zones, and/or determination of trusted packet flows.”) Chua ‘877 at 5:50-6:5 (“SDN 106 generally serves to interconnect various endpoint devices, such as client device 102 and server device 104. In addition, SDN 106 may provide services to network traffic flowing between client device 102 and server device 104. Alternatively, SDN 106 may provide services to client device 102, without further directing traffic to server device 106. For example, administrator 114 may use SDN controller 112 to program network devices of SDN 106 to direct network traffic for client device 102 to one or more of service devices 116. Service devices 116 may include, for example, intrusion detection service (IDS) devices, intrusion prevention system (IPS) devices, web proxies, web servers, web-application firewalls and the like. In other examples, service devices 116 may, additionally or alternatively, include devices for provid-ing services such as, for example, denial of service (DoS) protection, distributed denial of service (DDoS) protection, traffic

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		filtering, wide area network (WAN) acceleration, or other such services. Service devices 116 may also addition-ally or alternatively include malware detection devices, net-work anti-virus devices, network packet capture and analysis devices, honeypot devices, reflector net devices, tar pit devices, domain name service (DNS) and global DNS server devices, mail proxies, and anti-spam devices.”) Chua ‘877 at 6:6-24 (“Service devices 116 may, additionally or alternatively, include devices in various device categories such as, for example, network and application security devices, application optimization devices, scaling devices, traffic shaping devices, and/or monitoring and analytics devices. Moreover, although shown as individual devices, it should be understood that service devices may be realized by physical devices, multi-tenant devices, or using virtual services (e.g., cloud-based services). Moreover, service devices 116 may represent multi-function devices. For purposes of example and ease of explanation, this disclosure primarily describes individual service devices. However, it should be understood that the techniques of this disclosure may be readily applied to virtual devices and cloud-based applications, in addition or in the alternative to physical devices. Likewise, where this disclosure refers to a switch or other network device, it should be understood that these techniques may apply to virtual switches or other virtual network devices.”) Chua ‘877 at 7:3-13 (“Devices that may be plugged into (that is, communicatively coupled to) SDN controller 112 (also sometimes referred to as a "FlowDirector") generally include classes of devices found in most network-based DMZs, including firewalls, web proxies, mail proxies, AV (anti-virus) proxies, mail systems, IDS (intrusion detection systems), IPS (intrusion prevention systems), VPN (virtual private network) servers, web application firewalls, vulnerability scanners, network recording and analysis systems, and packet shapers. Most of these devices are either security devices, or traffic engineering or visibility devices, in some examples.”) Chua ‘877 at 14:32-51 (“One example use case for SDN controller 112 includes performing internal security zone partitioning. In today's enterprise environment, certain flows can be trusted, based on security controls placed on the end points, while others must be assumed to have some potential for risk. SDN controller 112 may create security zones based both on physical topol-ogy as well as threat assessments based on L2-L4 header information. Business-level security rules can be implemented directly on SDN controller 112 to direct

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		only higher risk flows through specific L4-L 7 devices (e.g., service devices 116) to monitor for or block malicious traffic. That is, when an SDN interconnects a set of enterprise network devices of a common enterprise network and also provides connections for the enterprise network devices outside of the enterprise network, SDN controller 112 may determine that connections between the enterprise network devices within the enterprise network can be trusted, whereas connections to network devices outside the enterprise network cannot be trusted and, therefore, should be monitored by a security device.”) Chua ‘877 at 14:52-63 (“Thus, SDN controller 112 may determine separate sets of packet flows based on security controls, e.g., a first set of packet flows that can be trusted and a second set of packet flows that are not trusted. Then, SDN controller 112 may determine a first set of one or more paths for the first set of packet flows that omit a security device for the first set of packet flows (that is, based on the determination that the first set of packet flows can be trusted), and a second set of one or more paths for the second set of packet flows that direct the second set of packet flows through the security device (based on the determination that the second set of packet flows are not trusted).”) Chua ‘877 at 14:64-15:3 (“The security controls may include various types of information. For example, the security controls may specify values for one or more packet headers at various layers of the Open Systems Interconnection (OSI) network model. The security controls may specify information for any or all of network layers two, three, four, five, six, and/or seven of the OSI model.”) Chua ‘877 at 16:23-44 (“More particularly, control unit 130 may configure any of service devices 116 to send data representative of a particular event to SDN controller 112, and control unit 130 may auto-matically reprogram one or more network devices of SDN 106 in response to such data. For example, security monitor-ing applications of service devices 116 may determine that a specific source port, destination port, source IP address, des-tination IP address, or the like should be acted upon. Alter-natively, security monitoring applications may determine that, due to content or deep packet inspection, a specific type of traffic is malicious and should be blocked. In either case, the corresponding one of service devices 116 may send a message to SDN controller 112 representative of these deter-minations. As yet another example, a network performance device may monitor various performance

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		metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics. SDN controller 112 may respond by programming network devices of SDN 106 to perform a programmed action, such as allowing corresponding traffic, blocking corresponding traf-fic, mirroring corresponding traffic, redirecting correspond-ing traffic.”) Chua ‘877 at 19:60-20:4 (“FIG. 3 is a conceptual diagram illustrating an example 60 system 200 including various devices that may be used in accordance with the techniques of this disclosure. In this example, system 200 includes various network devices, including firewall 206, router 208, switch 210, web proxy 212, intrusion detection system (IDS) 214, web server 216, 65 administrator ("admin") workstation 220, and software defined network (SDN) controller 218. Web clients 202 can access system 200 via a network, such as the Internet, e.g., Internet 204. Internet 204 may include additional network devices not explicitly shown in FIG. 3, such as routers, switches, hubs, gateways, security devices, or the like.”)

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14	The method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet.	Kempf discloses the method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet. For example, Kempf discloses packet processing for security purposes. A person of ordinary of skill in the art would understand the current architectures could be modified to provide deep packet inspection functionality. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 9. Kempf at [0037] (“The EPC architecture also contains little flexibility for specialized treatment of user flows. Though the architec-ture does provide support for establishing

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		quality of service (QoS), other sorts of data management are not available. For example services involving middle boxes, such as specialized deep packet inspection or interaction with local data caching and processing resources that might be utilized for transcod-ing or augmented reality applications, is difficult to support with the current EPC architecture. Almost all such applica-tions require the packet flows to exit through the PDN Gate-way, thereby being de-tunnelled from GTP, and to be pro-cessed within the wired network.") Kempf at [0065] ("A cloud computing system can be composed of any number of computing devices having any range of capabili-ties (e.g., processing power or storage capacity). The cloud computing system can be a private or public system. The computing devices can be in communication with one another across any communication system or network. A cloud com-puting system can support a single cloud or service or any number of discrete clouds or services. Services, applications and similar programs can be virtualized or executed as stan-dard code. In one embodiment, cloud computing systems can support web services applications. Web services applications consist of a load balancing front end that dispatches requests to a pool of Web servers. The requests originate from appli-cations on remote machines on the Internet and therefore the security and privacy requirements are much looser than for applications in a private corporate network.") Kempf at [0066] ("Cloud computer systems can also support secure multi-tenancy, in which the cloud computer system provider offers virtual private network (VPN)-like connections between the client's distributed office networks outside the cloud and a VPN within the cloud computing system. This allows the client's applications within the cloud computing system to operate in a network environment that resembles a corporate WAN. For private data centers, in which services are only offered to customers within the corporation owning the data center, the security and privacy requirements for multi-tenancy are relaxed. But for public data centers, the cloud operator must ensure that the traffic from multiple tenants is isolated and there is no possibility for traffic from one client to reach another client network.") Kempf at [0070] ("The cloud manager 1303 monitors the central pro-cessor unit (CPU) utilization of the EPC control plane entities 1307 and the control plane traffic between the EPC control plane entities 1307 within the cloud. It also monitors the control plane traffic between the end user devices (UEs) and E-NodeBs, which do not have control plane entities

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		in the cloud computing system 1301, and the EPC control plane entities 1307. If the EPC control plane entities 1307 begin to exhibit signs of overloading, such as the utilization of too much CPU time, or the queueing up of too much traffic to be processed, the overloaded control plane entity 1307 requests that the cloud manager 1303 start up a new VM to handle the load. Additionally, the EPC control plane entities 1307 them-selves can issue event notifications to the cloud manager 1303 if they detect internally that they are beginning to experience overloading.") Kempf at [0074] ("The operation of the EPC cloud computer system as follows. The UE 1317, E-NodeB 1317, S-GW-C 1307, and P-GW-C signal 1307 to the MME, PCRF, and HSS 1307 using the standard EPC protocols, to establish, modify, and delete bearers and GTP tunnels. This signaling triggers pro-cedure calls with the OpenFlow controller to modify the routing in the EPC as requested. The OpenFlow controller configures the standard OpenFlow switches, the Openflow S-GW-D 1315, and P-GW-D 1311 with flow rules and actions to enable the routing requested by the control plane entities. Details of this configuration are described in further detail herein below.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0084] ("GTP virtual ports are configured from the Open-Flow controller using a configuration protocol. The details of the configuration protocol are switch-dependent. The con-figuration protocol must support messages that perform following functions: allow the controller to query for and return an indication whether the switch supports GTP fast path virtual ports and what virtual port numbers are used for fast path and slow path GTP-U processing; and allow the controller to instantiate a GTP-U fast path virtual port within a switch datapath for use in the OpenFlow table set-output-port action. The configuration command must be run in a transaction so that, when the results of the action are reported

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		back to the controller, either a GTP-U fast path virtual port for the requested datapath has been instantiated or an error has returned indicating why the request could not be honored. The command also allows the OpenFlow controller to bind a GTP-U virtual port to a physical port. For decapsulation virtual ports, the physical port is an input port. For encapsu-lation virtual ports, the physical port is an output port.") Kempf at [0091] ("When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.") Kempf at [0104] ("In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.") Kempf at [0106] ("This encapsulates the packet and sends it to the OpenFlow controller.") Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Kempf in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 14 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

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		For example, Chua ‘877 discloses analyzing, including deep packet inspection, performed by the controller on packets received. Chua ‘877 at 31:48-59 (“In some examples, SDN controller 112 further performs deep packet inspection (DPI) on packets from client device 102 (402). For example, SDN controller 112 may inspect one or more preliminary packets of packet flows originating from or directed to client device 102, and after determining that the packet flows are not malicious (after a predetermined number of packets), stop inspecting the packet flows. Alternatively, SDN controller 112 may program network devices of SDN 106 to forward a predetermined number of packets of the packet flows originating from or destined for client device 102 through a deep packet inspection service device, which may correspond to one of service devices 116.”) Chua ‘877 at 10:48-52 (“As another possible extension, the central control platform can also capture and inspect the first or a fixed number of packets to perform deep packet inspection for application classification to extend the policy enforcement to specific application types.”) Chua ‘877 at 16:23-44 (“More particularly, control unit 130 may configure any of service devices 116 to send data representative of a particular event to SDN controller 112, and control unit 130 may auto-matically reprogram one or more network devices of SDN 106 in response to such data. For example, security monitor-ing applications of service devices 116 may determine that a specific source port, destination port, source IP address, des-tination IP address, or the like should be acted upon. Alter-natively, security monitoring applications may determine that, due to content or deep packet inspection, a specific type of traffic is malicious and should be blocked. In either case, the corresponding one of service devices 116 may send a message to SDN controller 112 representative of these deter-minations. As yet another example, a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics. SDN controller 112 may respond by programming network devices of SDN 106 to perform a programmed action, such as allowing corresponding traffic, blocking corresponding traf-fic, mirroring corresponding traffic, redirecting correspond-ing traffic.”)

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		Chua ‘877 at 31:48-59 (“In some examples, SDN controller 112 further performs deep packet inspection (DPI) on packets from client device 102 (402). For example, SDN controller 112 may inspect one or more preliminary packets of packet flows originating from or directed to client device 102, and after determining that the packet flows are not malicious (after a predetermined number of packets), stop inspecting the packet flows. Alternatively, SDN controller 112 may program network devices of SDN 106 to forward a predetermined number of packets of the packet flows originating from or destined for client device 102 through a deep packet inspection service device, which may correspond to one of service devices 116.”) For example, Chandrasekaran discloses the controller performing Deep Packet Inspection, which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined, i.e., analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful

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		classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.") Chandrasekaran at [0020] ("In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.") Chandrasekaran at [0021] ("Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.") Chandrasekaran at [0023] ("In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.")

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		Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”)

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15[a]	The method according to claim 9, wherein the packet comprises distinct header and payload fields, and	Kempf discloses the method according to claim 9, wherein the packet comprises distinct header and payload fields. For example, Kempf discloses packets with packet fields and payload fields. *See supra* at Claim 9. Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.") Kempf at [0046] ("A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0050] ("FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.")

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		Kempf at [0051] ("FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.") Kempf at [0052] ("Actions allow manipulating of tag stacks by pushing and popping labels. Combined with multiple tables, VLAN or MPLS label stacks can be processed by matching one label per table. FIG. 7 is a flow chart of one embodiment of a header parsing process. The parsing process matches a packet header by initializing a set of match fields (Block 701) and checking for the presence of a set of different header types. The process checks for a VLAN tag (Block 703). If the VLAN tag is present, then there are a series of processing steps for the VLAN tag (Blocks 705-707). If the switch supports MPLS (Block 709), then there are a series of steps for detecting and processing the MPLS header information (Blocks 711-715). If the switch supports address resolution protocol (ARP), then there are a series of steps for processing the ARP header (Blocks 719 and 721). If the packet has an IP header (Block 723), then there are a series of steps for processing the IP header (Blocks 725-733). This process is performed for each received packet.") Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one

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		embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0086] (“In one embodiment, an OpenFlow GTP gateway maintains a hash table mapping GTP TEIDs into the tunnel header fields for their bearers. FIG. 18 is a diagram of the structure of a flow table row. The TEID hash keys are calcu-lated using a suitable hash algorithm with low collision fre-quency, for example SHA-1. The gateway maintains one such flow table row for each GTP TEID/bearer. The TEID field contains the GTP TEID for the tunnel. The VLAN tags and MPLS labels fields contain an ordered list of VLAN tags and/or MPLS labels defining tunnels into which the packet needs to be routed. The VLAN priority bits and MPLS traffic class bits are included in the labels. Such tunnels may or may not be required. If they are not required, then these fields are empty. The tunnel origin source IP address contains the address on the encapsulating gateway to which any control traffic involving the tunnel should be directed (for example, error indications). The tunnel end destination IP address field contains the IP address of the gateway to which the tunneled packet should be routed, at which the packet will be decap-sulated and removed from the GTP tunnel. The QoS DSCP field contains the DiffServe Code Point, if any, for the bearer in the case of a dedicated bearer. This field may be empty if the bearer is a default bearer with best effort QoS, but will contain nonzero values if the bearer QoS is more than best effort.”)

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		Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0115] (“In another embodiment, OpenF!ow 1.2 supports an extensible match structure, OXM, shown in FIG. 22, in which the flow match is encoded as a type-length-value. The oxm_ class field values 0x0000 to 0x7FFF are reserved for Open Network Foundation members, Ox8000 to 0xFFFE are reserved for future standardization, and 0xFFFF is designated for experimentation. The oxm_field identifies a subtype within the class, the HM field specifies whether the value contains a bitmask (yes=l, no=0), and oxm_length contains the length of the value payload.”) Kempf at [0116] (“For GTP TEID routing, we define a value payload by the ersmt_gtp_match structure:

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		struct ersmt_gtp_match {
		uint16_t gtp_type_n_flags;
		uint32_t gtp_teid;
		};

15[b]	wherein the analyzing comprises checking part of, or whole of, the payload field.	Kempf discloses wherein the analyzing comprises checking part of, or whole of, the payload field. For example, Kempf discloses processing the message type field of the packet. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG.

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		17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.") Kempf at [0094] ("In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).") Kempf at [0098] ("The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.") Kempf at [0115] ("In another embodiment, OpenF!ow 1.2 supports an extensible match structure, OXM, shown in FIG. 22, in which the flow match is encoded as a type-length-value. The oxm_ class field values 0x0000 to 0x7FFF are reserved for Open Network Foundation members, Ox8000 to 0xFFFE are reserved for future standardization, and 0xFFFF is designated for experimentation. The oxm_field identifies a subtype within the

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		class, the HM field specifies whether the value contains a bitmask (yes=l, no=0), and oxm_length contains the length of the value payload.”)
		
		Kempf at [0116] (“For GTP TEID routing, we define a value payload by the ersmt_gtp_match structure:
		
		`struct ersmt_gtp_match {`
		`uint16_t gtp_type_n_flags;`
		`uint32_t gtp_teid;`
		`};`

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16[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Kempf discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
16[b]	the header comprises one or more flag bits, and	Kempf discloses the header comprises one or more flag bits. For example, Kempf discloses packet headers with flag bits. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other

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		embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.") Kempf at [0082] ("In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0088] ("To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header

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		flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper

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		two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”)
		
		Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenFlow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		`struct ermst_gtp_mask {`
		`uint32_t gtp_wildcard;`
		`uint16_t gtp_flag_mask;`
		`};`
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

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16[c]	wherein the packet-applicable criterion is that one or more of the flag bits is set.	Kempf discloses wherein the packet-applicable criterion is that one or more of the flag bits is set. For example, Kempf flow table matches in which the flag bits is set. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message

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		type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0088] ("To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.") Kempf at [0092] ("In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.")

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		Kempf at [0094] ("In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).") Kempf at [0098] ("The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.") Kempf at [0114] ("The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.") Kempf at [0117] ("The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP

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		TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenF!ow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		struct ermst_gtp_mask {
		uint32_t gtp_wildcard;
		uint16_t gtp_flag_mask;
		};
		
		Kempf at [0118] ("The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.")
		
		Kempf at Figure 10

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		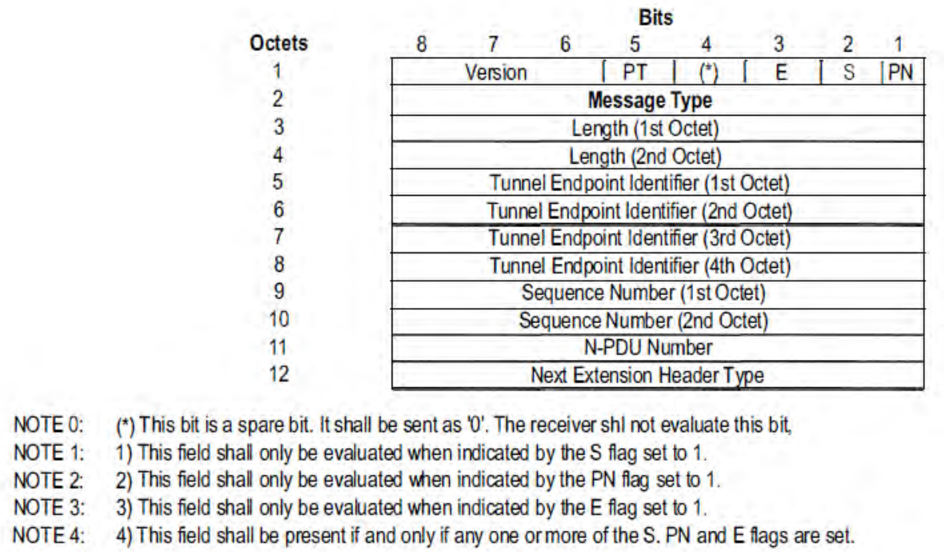 FIG. 10

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17[a]	The method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet, and	Kempf discloses the method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet. For example, Kempf discloses packets in a network that are part of the Transmission Control Protocol. *See supra* at Claim 16. Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict

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		the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.") Kempf at [0089] ("In one embodiment, the system implements a GTP fast path encapsulation virtual port. When requested by the S-GW-C and P-GW-C control plane software running in the cloud computing system, the OpenFlow controller programs the gateway switch to install rules, actions, and TEID hash table entries for routing packets into GTP tunnels via a fast path GTP encapsulation virtual port. The rules match the packet filter for the input side of GTP tunnel's bearer. Typi-cally this will be a 4 tuple of: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The IP source address and destination address are typically the addresses for user data plane traffic, i.e. a UE or Internet service with which a UE is transacting, and similarly with the port numbers. For a rule matching the GTP-U tunnel input side, the associated instructions and are the following: Write-Metadata (GTP-TEID, OxFFFFFFFF) Apply-Actions (Set-Output-Port GTP-Encap-VP") Kempf at [0101] ("In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-

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		PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)")
17[b]	wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof.	Kempf discloses wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. For example, Kempf discloses packet headers with flag bits. A person of ordinary skill in the art would understand that such flag bits can comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Kempf is found to not meet this limitation, wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof would have been obvious to a person having ordinary skill in the art, as explained below. Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-

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		Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”)

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		Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”)

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		Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenFlow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		`struct ermst_gtp_mask {`
		`    uint32_t gtp_wildcard;`
		`    uint16_t gtp_flag_mask;`
		`};`
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Kempf in combination with (1) the knowledge of a person of ordinary skill in the art, alone

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		or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 17[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses TCP packets with flag bits including SYN, ACK, FIN, and R flag bits, i.e., wherein the one or more flag bits comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”)

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		Copeland at [0090] (“Host2 responds with a SYN-ACK packet. In this message, both the SYN flag and the ACK flag are set. Host2 provides the initial sequence number for its data to Hostl. Host2 also sends to Hostl the acknowledgment number that is the next sequence number Host2 expects to receive from host 1. In the SYN-ACK packet sent by Host2, the acknowl-edgment number is the initial sequence number of Hostl plus 1, which should be the next sequence number received.”) Copeland at [0091] (“Hostl responds to the SYN-ACK with a packet with just the ACK flag set. Hostl acknowledges that the next packet of information received from Host2 will be Host2's initial sequence number plus 1. The three-way handshake is complete and data is transferred.”) Copeland at [0092] (“Host2 responds to ACK packet with its own ACK packet. Host2 acknowledges the data it has received from Hostl by sending an acknowledgment number one greater than its last received data sequence number. Both hosts send packets with the ACK flag set until the session is to end although the P and U flags may also be set, if warranted.”) Copeland at [0093] (“As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.”) Copeland at [0094] (“Host2 acknowledges the FIN packet by sending its own ACK packet. The ACK packet has the acknowledge-ment number one greater than the sequence number of Hostl's FIN-ACK packet. ACK packets are still delivered between the two hosts, except that HOSTl's packets have no data appended to the TCP/IP end of the headers.”) Copeland at [0095] (“When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.”)

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		As another example, Uchida discloses the TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag *i.e.*, the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit. Uchida at [0040] ("A flow end can be detected by various methods as below. For example, in one method, a protocol end message is checked. For example, in the TCP (Transmission Control Protocol), a FIN flag is checked. In this way, the end of communication, that is, the end of a flow using communica-tion, can be detected. In practice, after a FIN flag, communi-cation with an ACK packet is generated in a reverse-direction flow (a flow in which the source and the destination are reversed). Thus, by detecting the ACK flag in the reverse-direction flow after the FIN packet, a flow end can be deter-mined. Further, since the TCP is used in bidirectional com-munication, the forward- and reverse-direction flows can be used as a pair to determine a flow end. Namely, if the end of a flow is detected, a process rule corresponding to the reverse-direction flow of the flow can also be determined to be unnec-essary. Alternatively, a communication end can also be deter-mined when a predetermined time elapses after reception of a SYN packet and a timeout is determined. Still alternatively, a communication end can be determined by reception of a RST packet. These methods will be described in more detail later as specific examples.") Uchida at [0050] ("The flow end check unit can use at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag extracted by the end determination information extraction unit to determine a flow end.") Uchida at [0055] ("In the process rule update method, a flow end can be determined by at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag.") Uchida at [0102] ("Next, specific examples 1 to 3 will be described. In the examples 1 to 3, a flow end is determined by combining features of the above individual exemplary embodiments and using TCP (Transmission Control Protocol) flags.") Uchida at [0103] ("FIG. 6 is a state transition diagram of TCP connec-tion. "CLOSED" at the top of FIG. 6 represents the end of TCP communication, and portions connected thereto repre-sent states prior to the end of TCP communication. Approxi-mately 2MSL (MSL: Maximum Segment Lifetime) is the maximum amount of time required to reach the above

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		"CLOSED," that is, if the packet forwarding apparatus stands by for approximately 2MSL after both FINs flow, the above "CLOSED" is reached. Thus, after a FIN is confirmed in either direction, if this 2MSL elapses, basically, a communi-cation end can be determined. Even if the state does not change smoothly because of packet loss or the like (for example, even if an ACK packet does not arrive after "CLOS-ING"), a retransmitted packet is forwarded immediately after this 2MSL. Thus, the end of TCP communication can be determined if a new FIN packet is not received within the time corresponding to the 2MSL and a margin (2MSL+a) at long-est.”) Uchida at [0104] (“Hereinafter, the description will be made, assuming that a packet forwarding apparatus Cl according to the present invention relays TCP communication between a com-puter (client) Dl 0 and a server D20 that use network configu-rations illustrated in FIG. 7. In the example of FIG. 7, the computer Dl0 belongs to a network represented by 192.168. 0./24 and is set by 192.168.0.10. The server D20 belongs to a network represented by 192.168.1./24 and is set by 192.168. 1.10. As in the case of the OpenFlow controller described in Non-Patent Documents 1 and 2, a control apparatus (control-ler) Dl is connected to the packet forwarding apparatus Cl via a dedicated channel and manages connection between the two networks. In the following description, the control appa-ratus (controller) Dl controls the packet forwarding appara-tus Cl so that connection from other networks appears as communication from network number 1 (192.168.1.1) of the respective networks (see process rule actions in FIG. 19). In addition, in the present specific example, since FIN packets are monitored, the end determination information extraction unit Cl 7 monitors a protocol stack, including: fields in which the TCP is determined; and the FIN flag in the TCP header.”) Uchida at [0105] (“FIG. 8 is a flow chart of a flow end determination process using FIN flags. In FIG. 8, steps relating to a timeout determination are added to steps Slll to S116 in the flow chart in FIG. 3. Thus, the flow chart in FIG. 8 includes more detailed steps than the flow chart of FIG. 3. Hereinafter, operations will be described with reference to FIGS. 3, 6, and 8 and FIGS. 9 to 13. In practice, prior to TCP/IP communi-cation, ARP (Address Resolution Protocol) communication is executed, and a process rule may be set in that stage. However, for ease of description, description of the ARP communication will be omitted. The following description will be made based on communication at the TCP/IP level.”)

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		Uchida at [0106] (“First, the computer Dl0 starts communication with the server D20. For an initial establishment of communica-tion, a packet (SYN) is inputted to the packet forwarding apparatus Cl (start of ACTIVE OPEN through SYN forward-ing in FIG. 6). The packet reception unit Cl0 receives and stores this first packet in the packet storage unit Cll (steps SlOl to S102 in FIG. 3).”) Uchida at [0107] (“The packet reception unit C10 notifies the packet process information extraction unit C12 and the end determination information extraction unit C17 of reception of the packet. The packet process information extraction unit C12 refers to the packet storage unit C11 and extracts information such as IP source and destination information that is necessary to search for a process rule (step S103 in FIG. 3). Hereinafter, a process corresponding to steps S103 to S110 in FIG. 3 will be executed.”) Uchida at [0115] (“Upon receiving a notification that the packet has been received by the packet reception unit Cl 0, the end deter-mination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN flag (step S201 in FIG. 8).”) Uchida at [0116] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 1; the source address is 192.168. 0.10; the destination is 192.168.1.10; and the protocol is TCP (the type is Ox0006)) and stands by until forwarding of the packet. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a process rule to be deleted from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule to be deleted represents that the source address is 192.168.1.1; the destination is 192.168.1.1 0; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”)

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		Uchida at [0117] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0121] (“Next, after an ACK reply in response to the FIN packet from the computer DlO is forwarded from the server D20 in the same way as the above normal packet (start of PASSIVE CLOSE in FIG. 6), the server D20 transmits a FIN packet to the computer DlO. When this FIN packet is inputted to the packet forwarding apparatus Cl, the flow end determi-nation process from steps Slll to S116 is started, as in the case of the above start of ACTIVE CLOSE.”) Uchida at [0122] (“Upon receiving a notification that the packet has been received from the packet reception unit Cl0, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN packet (step S201 in FIG. 8).”) Uchida at [0123] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a modified process rule represents that the source address is 192.168.1. 10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extrac-tion unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”)

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		Uchida at [0124] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203 in FIG. 8). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0125] (“At this point, since a FIN packet has been transmit-ted, the flow end check unit C18 uses the information for identifying a process rule to be deleted as a key, extracts the process rule (process rule corresponding to ingress port 2 in FIG. 11) from the process rule storage unit C13, and marks a FIN packet reception flag (steps S204 to S205 in FIG. 8). This process corresponds to the internal state update process in step S115 in FIG. 3.”) Uchida at [0134] (“Referring back to the state transition diagram of TCP connection in FIG. 6, there are two cases where "CLOSED" at the top of FIG. 6 is reached without a state transition involving FIN flags. One case arises when the ses-sion is closed from SYN_SENT, which is reached when a SYN packet in which a SYN flag is marked is transmitted. The other case arises when a timeout is generated. In such case, while the packet forwarding apparatus cannot monitor the closed session, the packet forwarding apparatus can con-firm a timeout in the following way. In the present specific example, a flow end is determined by this timeout.”) Uchida at [0135] (“n the present specific example, if a SYN/ ACK packet does not flow in a direction opposite to the SYN packet flow direction within a predetermined time (from "SYN_ RCVD" to "SYN_SENT" in FIG. 6), a timeout is determined.”) Uchida at [0136] (“FIG. 14 is a flow chart illustrating a flow end deter-mination process using a SYN flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the dif-ference.”) Uchida at [0137] (“In FIG. 14, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage, unit Cll, monitors a TCP SYN flag, and finds a SYN packet (step S301 in FIG. 14).”)

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		Uchida at [0138] (“Since a SYN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule repre-sents that the source address is 192.168.1.10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the SYN packet has been received and these items of information (step S302 in FIG. 14).”) Uchida at [0139] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether a SYN flag is set in a prede-termined packet header position and an ACK flag is not marked (step S303 in FIG. 14). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0148] (“ Next, a third specific example in which a flow end determination is executed by using a TCP RST (reset) flag will be described.”) Uchida at [0149] (“Referring back to the state transition diagram of TCP connection in FIG. 6, there is a transition from "SYN_ RCVD," which is a communication establishment standby state, to "LISTEN," which is a communication standby state. A TCP RST (reset) flag signifies release of connection and retry of communication. Namely, since a RST packet in which this RST flag is set signifies invalidation of communi-cation, by detecting this RST flag, a flow end can be deter-mined.”) Uchida at [0150] (“FIG. 16 is a first flow chart illustrating a flow end determination process using a RST flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the difference.”)

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		Uchida at [0151] (“In FIG. 16, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP RST flag, and finds a RST packet (step S401 in FIG. 16).”) Uchida at [0152] (“Since a RST flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the RST packet has been received and these items of information (step S402 in FIG. 16).”) Uchida at [0164] (“For example, in a specific example of the present invention, certain TCP flags are monitored. A single packet forwarding apparatus can monitor these flags in a parallel fashion. For example, after a packet that triggers a flow end is detected, the above process may be allowed to branch to the above FIGS. 8, 14, and 16 (17) to realize parallel monitoring.”)

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18[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Kempf discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
18[b]	the header comprises at least the first and second entities addresses in the packet network, and	Kempf discloses the header comprises at least the first and second entities addresses in the packet network. For example, Kempf discloses headers with source and destination addresses of the electronic devices in the network in which the packet is sent.

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		Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0059] (In the EPC, a bearer is a transmission channel through an EPC packet network which has a defined set of data transmission characteristics (quality of service data rate and flow control). EPC bearers are typically implemented at the network layer as DiffServ Code Points (DSCPs) or at the MAC layer as IEEE 802.lq VLANs with 802.lp (incorpo-rated into the 802.ld standard0 traffic class priorities,. The PCRF (Policy and Charging Resource Function) 801 identi-fies packet flows from the user equipment (UE) 807 that require bearers based on service requests from subsystems such as the IP multimedia subsystem (IMS). The packet flows to be included in a bearer are identified to the gateways and radio base station (E-NodeB) by 5 tuples, consisting of the IP source and destination address, the IP source and destination port, and the protocol identifier. The five tuples together with a DSCP for the QoS class identify an uplink and downlink packet filter. One bearer is set up per terminal IP address and QoS traffic class. The PCRF supplies a collection of four QoS parameters describing the bearer including: a quality class identifier (QCI) that specifies the QoS for the radio; allocation retention priority (ARP), which is an indicator of how the control plane should prioritize the bearer when requests for modification are made and resource conflicts arise; and a guaranteed bit rate (GBR) and maximum bit rate (MBR, optional) where these specify the guaranteed and maximum bit rates the bearer can receive. These are only defined for guaranteed-i.e. non-best effort-bearers.”) Kempf at [0061] (“In addition to the QoS parameters, each bearer has an associated GTP tunnel. A GTP tunnel consists of the IP address of the tunnel endpoint nodes (radio base station, S-GW 803, and P-GW 805), a source and destination UDP port, and a Tunnel Endpoint Identifier (TEID). GTP tunnels are unidirectional, so each bearer is associated with two TEIDs, one for the uplink and one for the downlink tunnel. One set of GTP tunnels (uplink and downlink) extends between the radio base station and the S-GW 803 and one set

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		extends between the S-GW 803 and the P-GW 805. The UDP destination port number for GTP-U is 2152 while the desti-nation port number for GTP-C is 2123. The source port num-ber is dynamically allocated by the sending node. FIG. 10 is a diagram of one embodiment of the header fields in the primary GTP-U encapsulation header.") Kempf at [0079] ("FIG. 16 is a diagram of one embodiment of a process for EPC peering and differential routing for specialized ser-vice treatment. The OpenFlow signaling, indicated by the solid lines and arrows 1601, sets up flow rules and actions on the switches and gateways within the EPC for differential routing. These flow rules direct GTP flows to particular loca-tions. In this example, the operator in this case peers its EPC with two other fixed operators. Routing through each peering point is handled by the respective P-GW-Dl and P-GW-D2 1603A, B. The dashed lines and arrows 1605 show traffic from a UE 1607 that needs to be routed to another peering operator. The flow rules and actions to distinguish which peering point the traffic should traverse are installed in the OpenFlow switches 1609 and gateways 1603A, B by the OpenFlow controller 1611. The OpenFlow controller 1611 calculates these flow rules and actions based on the routing tables it maintains for outside traffic, and the source and destination of the packets, as well as by any specialized for-warding treatment required for DSCP marked packets.") Kempf at [0086] ("In one embodiment, an OpenFlow GTP gateway maintains a hash table mapping GTP TEIDs into the tunnel header fields for their bearers. FIG. 18 is a diagram of the structure of a flow table row. The TEID hash keys are calcu-lated using a suitable hash algorithm with low collision fre-quency, for example SHA-1. The gateway maintains one such flow table row for each GTP TEID/bearer. The TEID field contains the GTP TEID for the tunnel. The VLAN tags and MPLS labels fields contain an ordered list of VLAN tags and/or MPLS labels defining tunnels into which the packet needs to be routed. The VLAN priority bits and MPLS traffic class bits are included in the labels. Such tunnels may or may not be required. If they are not required, then these fields are empty. The tunnel origin source IP address contains the address on the encapsulating gateway to which any control traffic involving the tunnel should be directed (for example, error indications). The tunnel end destination IP address field contains the IP address of the gateway to which the tunneled packet should be routed, at which the packet will be decap-sulated and removed from the GTP tunnel. The QoS DSCP field contains the DiffServe Code Point, if any, for the bearer in the case of a dedicated bearer. This field may be empty if the bearer is a default bearer

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		with best effort QoS, but will contain nonzero values if the bearer QoS is more than best effort.”) Kempf at [0089] (“In one embodiment, the system implements a GTP fast path encapsulation virtual port. When requested by the S-GW-C and P-GW-C control plane software running in the cloud computing system, the OpenFlow controller programs the gateway switch to install rules, actions, and TEID hash table entries for routing packets into GTP tunnels via a fast path GTP encapsulation virtual port. The rules match the packet filter for the input side of GTP tunnel's bearer. Typi-cally this will be a 4 tuple of: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The IP source address and destination address are typically the addresses for user data plane traffic, i.e. a UE or Internet service with which a UE is transacting, and similarly with the port numbers. For a rule matching the GTP-U tunnel input side, the associated instructions and are the following: Write-Metadata (GTP-TEID, OxFFFFFFFF) Apply-Actions (Set-Output-Port GTP-Encap-VP”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”)

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18[c]	wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses.	Kempf discloses wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses. For example, Kempf discloses the packet header field used in the flow table matching is a sources and/or destination address of the electronic devices. Kempf at [0044] ("FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.") Kempf at [0046] ("A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined

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		with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on

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		the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0089] (“In one embodiment, the system implements a GTP fast path encapsulation virtual port. When requested by the S-GW-C and P-GW-C control plane software running in the cloud computing system, the OpenFlow controller programs the gateway switch to install rules, actions, and TEID hash table entries for routing packets into GTP tunnels via a fast path GTP encapsulation virtual port. The rules match the packet filter for the input side of GTP tunnel's bearer. Typi-cally this will be a 4 tuple of: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The IP source address and destination address are typically the addresses for user data plane traffic, i.e. a UE or Internet service with which a UE is transacting, and similarly with the port numbers. For a rule matching the GTP-U tunnel input side, the associated instructions and are the following: Write-Metadata (GTP-TEID, OxFFFFFFFF) Apply-Actions (Set-Output-Port GTP-Encap-VP”)

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		Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0097] (“In one embodiment, the system implements han-dling of G-PDU packets with extension headers, sequence numbers, and N-PDU numbers. G-PDU packets with exten-sion headers, sequence numbers, and N-PDU numbers need to be forwarded to the local switch software control plane for processing. The OpenFlow controller programs 3 rules for this purpose. They have the following common header fields: the IP destination address is an IP address on which the gateway is expecting GTP traffic; and the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152).”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers,

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		or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0104] (“In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.”)

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19	The method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses.	Kempf discloses the method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses. For example, Kempf discloses packets with header fields comprised of Internet Protocol source and destination addresses. *See supra* at Claim 18. Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict

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		the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0052] (“Actions allow manipulating of tag stacks by pushing and popping labels. Combined with multiple tables, VLAN or MPLS label stacks can be processed by matching one label per table. FIG. 7 is a flow chart of one embodiment of a header parsing process. The parsing process matches a packet header by initializing a set of match fields (Block 701) and checking for the presence of a set of different header types. The process checks for a VLAN tag (Block 703). If the VLAN tag is present, then there are a series of processing steps for the VLAN tag (Blocks 705-707). If the switch supports MPLS (Block 709), then there are a series of steps for detecting and processing the MPLS header information (Blocks 711-715). If the switch supports address resolution protocol (ARP), then there are a series of steps for processing the ARP header (Blocks 719 and 721). If the packet has an IP header (Block 723), then there are a series of steps for processing the IP header (Blocks 725-733). This process is performed for each received packet.) Kempf at [0059] (“In the EPC, a bearer is a transmission channel through an EPC packet network which has a defined set of data transmission characteristics (quality of service data rate and flow control). EPC bearers are typically implemented at the network layer as DiffServ Code Points (DSCPs) or at the MAC layer as IEEE 802.lq VLANs with 802.lp (incorpo-rated into the 802.ld standard0 traffic class priorities,. The PCRF (Policy and Charging Resource Function) 801 identi-fies packet flows from the user equipment (UE) 807 that require bearers based on service requests from subsystems such as the IP multimedia subsystem (IMS). The packet flows to be included in a bearer are identified to the gateways and radio base station (E-NodeB) by 5 tuples, consisting of the IP source and destination address, the IP source and destination port, and the protocol identifier. The five tuples together with a DSCP for the QoS class identify an uplink and downlink packet filter. One bearer is set up per terminal IP address and QoS traffic class. The PCRF supplies a collection of four QoS parameters describing the bearer including: a quality class identifier (QCI) that specifies the QoS for the radio; allocation retention priority (ARP), which is an indicator of how the control plane should prioritize the bearer when requests for modification are made and resource conflicts arise; and a guaranteed bit rate (GBR) and maximum bit rate (MBR, optional) where these specify the guaranteed and maximum bit

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		rates the bearer can receive. These are only defined for guaranteed-i.e. non-best effort-bearers") Kempf at [0061] ("In addition to the QoS parameters, each bearer has an associated GTP tunnel. A GTP tunnel consists of the IP address of the tunnel endpoint nodes (radio base station, S-GW 803, and P-GW 805), a source and destination UDP port, and a Tunnel Endpoint Identifier (TEID). GTP tunnels are unidirectional, so each bearer is associated with two TEIDs, one for the uplink and one for the downlink tunnel. One set of GTP tunnels (uplink and downlink) extends between the radio base station and the S-GW 803 and one set extends between the S-GW 803 and the P-GW 805. The UDP destination port number for GTP-U is 2152 while the desti-nation port number for GTP-C is 2123. The source port num-ber is dynamically allocated by the sending node. FIG. 10 is a diagram of one embodiment of the header fields in the primary GTP-U encapsulation header.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0086] ("In one embodiment, an OpenFlow GTP gateway maintains a hash table mapping GTP TEIDs into the tunnel header fields for their bearers. FIG. 18 is a diagram of the structure of a flow table row. The TEID hash keys are calcu-lated using a suitable hash algorithm with low collision fre-quency, for example SHA-1. The gateway maintains one such flow table row for each GTP TEID/bearer. The TEID field contains the GTP TEID for the tunnel. The VLAN tags and MPLS labels fields contain an ordered list of VLAN tags and/or MPLS labels defining tunnels into which the packet needs to be routed. The VLAN priority bits and MPLS traffic class bits are included in the labels. Such tunnels may or may not be required. If they are not required, then these fields are empty. The tunnel origin source IP address contains the address on the encapsulating gateway to which any control traffic involving the tunnel should be directed (for example, error indications). The tunnel

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		end destination IP address field contains the IP address of the gateway to which the tunneled packet should be routed, at which the packet will be decap-sulated and removed from the GTP tunnel. The QoS DSCP field contains the DiffServe Code Point, if any, for the bearer in the case of a dedicated bearer. This field may be empty if the bearer is a default bearer with best effort QoS, but will contain nonzero values if the bearer QoS is more than best effort.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0089] (“In one embodiment, the system implements a GTP fast path encapsulation virtual port. When requested by the S-GW-C and P-GW-C control plane software running in the cloud computing system, the OpenFlow controller programs the gateway switch to install rules, actions, and TEID hash table entries for routing packets into GTP tunnels via a fast path GTP encapsulation virtual port. The rules match the packet filter for the input side of GTP tunnel's bearer. Typi-cally this will be a 4 tuple of: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP

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		destination port. The IP source address and destination address are typically the addresses for user data plane traffic, i.e. a UE or Internet service with which a UE is transacting, and similarly with the port numbers. For a rule matching the GTP-U tunnel input side, the associated instructions and are the following: Write-Metadata (GTP-TEID, OxFFFFFFFF) Apply-Actions (Set-Output-Port GTP-Encap-VP”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0097] (“In one embodiment, the system implements han-dling of G-PDU packets with extension headers, sequence numbers, and N-PDU numbers. G-PDU packets with exten-sion headers, sequence numbers, and N-PDU numbers need to be forwarded to the

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		local switch software control plane for processing. The OpenFlow controller programs 3 rules for this purpose. They have the following common header fields: the IP destination address is an IP address on which the gateway is expecting GTP traffic; and the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152).") Kempf at [0101] ("In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)") Kempf at [0104] ("In one embodiment, the system implements han-dling of GTP-C and GTP' control packets. Any GTP-C and GTP' control packets that are directed to IP addresses on a gateway switch are in error. These packets need to be handled by the S-GW-C, P-GW-C, and GTP' protocol entities in the cloud computing system, not the S-GW-D and P-GW-D enti-ties in the switches. To catch such packets, the OpenFlow controller must program the switch with the following two rules: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); for one rule, the UDP destination port is the GTP-U destination port (2152), for the other, the UDP destination port is the GTP-C destination port (2123); the GTP header flags and message type fields are wildcarded.")

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20[a]	The method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields, and	Kempf discloses the method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields. For example, Kempf discloses packets that belong to the Transmission Control Protocol that include source and destination ports, sequence numbers, and mask fields. *See supra* at Claim 1, 17[a]. Kempf at [0082] ("In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.") Kempf at [0088] ("To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.") Kempf at [0097] ("In one embodiment, the system implements han-dling of G-PDU packets with extension headers, sequence numbers, and N-PDU numbers. G-PDU packets with

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		exten-sion headers, sequence numbers, and N-PDU numbers need to be forwarded to the local switch software control plane for processing. The OpenFlow controller programs 3 rules for this purpose. They have the following common header fields: the IP destination address is an IP address on which the gateway is expecting GTP traffic; and the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and

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		fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
20[b]	wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values.	Kempf discloses wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values. For example, Kempf discloses header fields including TCP include source and destination ports, sequence numbers, and mask fields as matching fields in the flow table. Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”)

No.	’111 Patent Claim 20	Kempf
		Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0089] (“In one embodiment, the system implements a GTP fast path encapsulation virtual port. When requested by the S-GW-C and P-GW-C control plane software running in the cloud computing system, the OpenFlow controller programs the gateway switch to install rules, actions, and TEID hash table entries for routing packets into GTP tunnels via a fast path GTP encapsulation virtual port. The rules match the packet filter for the input side of GTP tunnel's bearer. Typi-cally this will be a 4 tuple of: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The IP source address and destination address are typically the addresses for user data plane traffic, i.e. a UE or Internet service with which a UE is transacting, and similarly with the port numbers. For a rule matching the GTP-U tunnel input side, the associated instructions and are the following:

No.	’111 Patent Claim 20	Kempf
		Write-Metadata (GTP-TEID, OxFFFFFFFF) Apply-Actions (Set-Output-Port GTP-Encap-VP”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0097] (“In one embodiment, the system implements han-dling of G-PDU packets with extension headers, sequence numbers, and N-PDU numbers. G-PDU packets with exten-sion headers, sequence numbers, and N-PDU numbers need to be forwarded to the local switch software control plane for processing. The OpenFlow controller programs 3 rules for this purpose. They have the following common header fields: the IP destination address is an IP address on which the gateway is expecting GTP traffic; and the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”)

No.	’111 Patent Claim 21	Kempf
21	The method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network.	Kempf discloses the method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network. For example, Kempf discloses a packet network including a local area network, wide area network, and the Internet. *See supra* at Claim 1. Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”)

No.	’111 Patent Claim 22	Kempf
22	The method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device.	Kempf discloses the method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device. For example, Kempf discloses electronic devices including subscriber end stations such as servers, laptops, smart phones, mobile phones, etc. that communicate packets between each other. *See supra* at Claim 1.

No.	’111 Patent Claim 22	Kempf
		Kempf at [0033] (“As used herein, a network element (e.g., a router, switch, bridge, etc.) is a piece of networking equipment, including hardware and software, that communicatively interconnects other equipment on the network (e.g., other network elements, end stations, etc.). Some network elements are "multiple services network elements" that provide sup-port for multiple networking functions (e.g., routing, bridg-ing, switching, Layer 2 aggregation, session border control, multicasting, and/or subscriber management), and/or provide support for multiple application services (e.g., data, voice, and video). Subscriber end stations (e.g., servers, worksta-tions, laptops, palm tops, mobile phones, smart phones, mul-timedia phones, Voice Over Internet Protocol (VOIP) phones, portable media players, GPS units, gaming systems, set-top boxes (STBs), etc.) access content/services provided over the Internet and/or content/services provided on virtual private networks (VPN s) overlaid on the Internet. The content and/or services are typically provided by one or more end stations (e.g., server end stations) belonging to a service or content provider or end stations participating in a peer to peer service, and may include public web pages (free content, store fronts, search services, etc.), private web pages (e.g., username/pass-word accessed web pages providing email services, etc.), corporate networks over VPNs, IPTV, etc. Typically, sub-scriber end stations are coupled (e.g., through customer premise equipment coupled to an access network (wired or wirelessly)) to edge network elements, which are coupled (e.g., through one or more core network elements to other edge network elements) to other end stations (e.g., server end stations). Kempf at [0034] (“The embodiments of the present invention provide a method and system for avoiding the disadvantages of the prior art. The disadvantages of the prior art are that prior imple-mentations of the evolved packet core use a pool of servers that are dedicated to a specific network entity, such as a server pool that is dedicated to hosting a mobility management entity (MME). When additional signaling demands require that extra capacity, then a new MME instance is instantiated in the server pool. However, when demand is high for the services of a policy and charging rules function (PCRF) and low for MMEs, the server pool dedicated to the PCRF servers will be heavily utilized, but the server pool for the MMEs is underutilized. These underutilized server pools continue to require maintenance and incur operating expenses, but are not providing optimum performance for the network operator.”)

No.	'111 Patent Claim 22	Kempf
		Kempf at [0035] ("In some situations, managed services companies build and run mobile operator networks, while the mobile operator itself handles marketing, billing, and customer rela-tions. The signaling and data traffic for each mobile operator network is kept private and isolated from the traffic of their competitors, even though their network and their competi-tors' networks may be managed by the same managed ser-vices company. The managed services company must main-tain a completely separate server pool and physical signaling network for each mobile operator it supports. As a result, there is a large duplication of resources and an underutiliza-tion of server capacity. This increases operating expenses for the managed services companies and the mobile operator network due to the additional equipment, power and cooling requirements.") Kempf at [0065] ("A cloud computing system can be composed of any number of computing devices having any range of capabili-ties (e.g., processing power or storage capacity). The cloud computing system can be a private or public system. The computing devices can be in communication with one another across any communication system or network. A cloud com-puting system can support a single cloud or service or any number of discrete clouds or services. Services, applications and similar programs can be virtualized or executed as stan-dard code. In one embodiment, cloud computing systems can support web services applications. Web services applications consist of a load balancing front end that dispatches requests to a pool of Web servers. The requests originate from appli-cations on remote machines on the Internet and therefore the security and privacy requirements are much looser than for applications in a private corporate network.") Kempf at [0143] ("In other embodiments, the split EPC architecture can be implemented in non-cloud and non-virtualized sys-tems. The control plane entities of the EPC architecture can be stored and executed on a single server or distributed across any number of servers or similar computing devices. Simi-larly, the control plane entities can be executed as standard software code and modules without virtualization or similar systems. These control plane entities can communicate with one another through local system or procedure calls, remote procedure calls or similar mechanisms. In further embodi-ments, a subset of the control plane entities can be virtualized or executed in a cloud computing system while another subset of the control plane entities can be executed in a server, distributed server system or similar system. The control plane entities can communicate with the data plane through the

No.	’111 Patent Claim 22	Kempf
		use of the OpenFlow protocol as described herein above or through other control protocols as described herein below.”)

No.	’111 Patent Claim 23	Kempf
23[a]	The method according to claim 22, wherein the server device comprises a web server, and	Kempf discloses the method according to claim 22, wherein the server device comprises a web server. For example, Kempf discloses servers that include web servers for web service applications. *See supra* at Claim 22. Kempf at [0033] (“As used herein, a network element (e.g., a router, switch, bridge, etc.) is a piece of networking equipment, including hardware and software, that communicatively interconnects other equipment on the network (e.g., other network elements, end stations, etc.). Some network elements are "multiple services network elements" that provide sup-port for multiple networking functions (e.g., routing, bridg-ing, switching, Layer 2 aggregation, session border control, multicasting, and/or subscriber management), and/or provide support for multiple application services (e.g., data, voice, and video). Subscriber end stations (e.g., servers, worksta-tions, laptops, palm tops, mobile phones, smart phones, mul-timedia phones, Voice Over Internet Protocol (VOIP) phones, portable media players, GPS units, gaming systems, set-top boxes (STBs), etc.) access content/services provided over the Internet and/or content/services provided on virtual private networks (VPN s) overlaid on the Internet. The content and/or services are typically provided by one or more end stations (e.g., server end stations) belonging to a service or content provider or end stations participating in a peer to peer service, and may include public web pages (free content, store fronts, search services, etc.), private web pages (e.g., username/pass-word accessed web pages providing email services, etc.), corporate networks over VPNs, IPTV, etc. Typically, sub-scriber end stations are coupled (e.g., through customer premise equipment coupled to an access network (wired or wirelessly)) to edge network elements,

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		which are coupled (e.g., through one or more core network elements to other edge network elements) to other end stations (e.g., server end stations).”) Kempf at [0034] (“The embodiments of the present invention provide a method and system for avoiding the disadvantages of the prior art. The disadvantages of the prior art are that prior imple-mentations of the evolved packet core use a pool of servers that are dedicated to a specific network entity, such as a server pool that is dedicated to hosting a mobility management entity (MME). When additional signaling demands require that extra capacity, then a new MME instance is instantiated in the server pool. However, when demand is high for the services of a policy and charging rules function (PCRF) and low for MMEs, the server pool dedicated to the PCRF servers will be heavily utilized, but the server pool for the MMEs is underutilized. These underutilized server pools continue to require maintenance and incur operating expenses, but are not providing optimum performance for the network operator.”) Kempf at [0035] (“In some situations, managed services companies build and run mobile operator networks, while the mobile operator itself handles marketing, billing, and customer rela-tions. The signaling and data traffic for each mobile operator network is kept private and isolated from the traffic of their competitors, even though their network and their competi-tors' networks may be managed by the same managed ser-vices company. The managed services company must main-tain a completely separate server pool and physical signaling network for each mobile operator it supports. As a result, there is a large duplication ofresources and an underutiliza-tion of server capacity. This increases operating expenses for the managed services companies and the mobile operator network due to the additional equipment, power and cooling requirements.”) Kempf at [0065] (“A cloud computing system can be composed of any number of computing devices having any range of capabili-ties (e.g., processing power or storage capacity). The cloud computing system can be a private or public system. The computing devices can be in communication with one another across any communication system or network. A cloud com-puting system can support a single cloud or service or any number of discrete clouds or services. Services, applications and similar programs can be virtualized or executed as stan-dard code. In one embodiment, cloud computing systems can support web services applications. Web services applications consist of a load balancing front end that

No.	'111 Patent Claim 23	Kempf
		dispatches requests to a pool of Web servers. The requests originate from appli-cations on remote machines on the Internet and therefore the security and privacy requirements are much looser than for applications in a private corporate network.") Kempf at [0143] ("In other embodiments, the split EPC architecture can be implemented in non-cloud and non-virtualized sys-tems. The control plane entities of the EPC architecture can be stored and executed on a single server or distributed across any number of servers or similar computing devices. Simi-larly, the control plane entities can be executed as standard software code and modules without virtualization or similar systems. These control plane entities can communicate with one another through local system or procedure calls, remote procedure calls or similar mechanisms. In further embodi-ments, a subset of the control plane entities can be virtualized or executed in a cloud computing system while another subset of the control plane entities can be executed in a server, distributed server system or similar system. The control plane entities can communicate with the data plane through the use of the OpenFlow protocol as described herein above or through other control protocols as described herein below.")
23[b]	wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device.	Kempf discloses wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device. For example, Kempf discloses subscriber end points including smartphones, mobile phones, laptops, etc. Kempf at [0033] ("As used herein, a network element (e.g., a router, switch, bridge, etc.) is a piece of networking equipment, including hardware and software, that communicatively interconnects other equipment on the network (e.g., other network elements, end stations, etc.). Some network elements are "multiple services network elements" that provide sup-port for multiple networking functions (e.g., routing, bridg-ing, switching, Layer 2 aggregation, session border control, multicasting, and/or subscriber management), and/or provide support for multiple application services (e.g., data, voice, and video). Subscriber end stations (e.g., servers, worksta-tions, laptops, palm tops, mobile phones, smart phones, mul-timedia phones, Voice Over Internet Protocol (VOIP) phones, portable media players, GPS units, gaming systems, set-top boxes (STBs), etc.) access content/services provided

No.	’111 Patent Claim 23	Kempf
		over the Internet and/or content/services provided on virtual private networks (VPN s) overlaid on the Internet. The content and/or services are typically provided by one or more end stations (e.g., server end stations) belonging to a service or content provider or end stations participating in a peer to peer service, and may include public web pages (free content, store fronts, search services, etc.), private web pages (e.g., username/pass-word accessed web pages providing email services, etc.), corporate networks over VPNs, IPTV, etc. Typically, sub-scriber end stations are coupled (e.g., through customer premise equipment coupled to an access network (wired or wirelessly)) to edge network elements, which are coupled (e.g., through one or more core network elements to other edge network elements) to other end stations (e.g., server end stations).”) Kempf at [0065] (“A cloud computing system can be composed of any number of computing devices having any range of capabili-ties (e.g., processing power or storage capacity). The cloud computing system can be a private or public system. The computing devices can be in communication with one another across any communication system or network. A cloud com-puting system can support a single cloud or service or any number of discrete clouds or services. Services, applications and similar programs can be virtualized or executed as stan-dard code. In one embodiment, cloud computing systems can support web services applications. Web services applications consist of a load balancing front end that dispatches requests to a pool of Web servers. The requests originate from appli-cations on remote machines on the Internet and therefore the security and privacy requirements are much looser than for applications in a private corporate network.”)

No.	’111 Patent Claim 24	Kempf
24	The method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol.	Kempf discloses the method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol. For example, Kempf discloses communication between network elements and the OpenFlow controller based on standard protocols including GPRS, GTP, OpenFlow, etc. *See supra* at Claim 22. Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g.

No.	’111 Patent Claim 24	Kempf
		cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.”) Kempf at [0006] (“A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).”) Kempf at [0007] (“A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a

No.	’111 Patent Claim 24	Kempf
		control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”) Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities,

No.	’111 Patent Claim 24	Kempf
		while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0074] (“The operation of the EPC cloud computer system as follows. The UE 1317, E-NodeB 1317, S-GW-C 1307, and P-GW-C signal 1307 to the MME, PCRF, and HSS 1307 using the standard EPC protocols, to establish, modify, and delete bearers and GTP tunnels. This signaling triggers pro-cedure calls with the OpenFlow controller to modify the routing in the EPC as requested. The OpenFlow controller configures the standard OpenFlow switches, the Openflow S-GW-D 1315, and P-GW-D 1311 with flow rules and actions to enable the routing requested by the control plane entities. Details of this configuration are described in further detail herein below.)

No.	’111 Patent Claim 24	Kempf
		Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0145] (“In other embodiments, other control protocols can be utilized in place of OpenFlow as described herein. The use of OpenFlow is presented by way of example and not limita-tion. Other control protocols can also be utilized to manage the communication between the control plane and data plane and configuration of the data plane of the split EPC architec-ture. An example of such a protocol is FORCES, an IETF standard protocol for splitting the control plane and forward-ing plane in networks. The FORCES protocol specification is described in RFC 5810. RFC 5812 describes the architecture of a FORCES forwarding element, the equivalent of an Open-Flow switch. The FORCES protocol itself does not directly support programming routes into the forwarding element, it is, instead, a framework for handling the interaction between the FORCES controller and a FORCES forwarding element. The forwarding element architecture describes how to design the protocol that actually allows a FORCES controller to program a FORCES forwarding element. One skilled in the art would understand that a FORCES based system could include features described herein above in relation to the OpenFlow embodiment, such as the GTP OpenFlow exten-sion, to allow the controller to program the switches for GTP TEID routing.”)

No.	’111 Patent Claim 27	Kempf
27	The method according to claim 1, wherein the network node comprises a router, a switch, or a bridge.	Kempf discloses the method according to claim 1, wherein the network node comprises a router, a switch, or a bridge. For example, Kempf discloses network elements such as a router, switch, bridge, etc. *See supra* at Claim 1. Kempf at [0033] (“As used herein, a network element (e.g., a router, switch, bridge, etc.) is a piece of networking equipment, including hardware and software, that communicatively interconnects other equipment on the network (e.g., other network elements, end stations, etc.). Some network elements are "multiple services network elements" that provide sup-port for multiple networking functions (e.g., routing, bridg-ing, switching, Layer 2 aggregation, session border control, multicasting, and/or subscriber management), and/or provide support for multiple application services (e.g., data, voice, and video). Subscriber end stations (e.g., servers, worksta-tions, laptops, palm tops, mobile phones, smart phones, mul-timedia phones, Voice Over Internet Protocol (VOIP) phones, portable media players, GPS units, gaming systems, set-top boxes (STBs), etc.) access content/services provided over the Internet and/or content/services provided on virtual private networks (VPN s) overlaid on the Internet. The content and/or services are typically provided by one or more end stations (e.g., server end stations) belonging to a service or content provider or end stations participating in a peer to peer service, and may include public web pages (free content, store fronts, search services, etc.), private web pages (e.g., username/pass-word accessed web pages providing email services, etc.), corporate networks over VPNs, IPTV, etc. Typically, sub-scriber end stations are coupled (e.g., through customer premise equipment coupled to an access network (wired or wirelessly)) to edge network elements, which are coupled (e.g., through one or more core network elements to other edge network elements) to other end stations (e.g., server end stations).”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”)

No.	’111 Patent Claim 27	Kempf
		Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.”) Kempf at [0041] (“The standard EPC control plane entities-the MME, PCRF, and HSS-are likewise deployed in the cloud, along with the control plane parts of the S-GW and P-GW, namely, the S-GW-C and the P-GW-C. The data plane con-sists of standard OpenFlow switches with enhancements as needed for routing GTP packets, rather than IP routers and Ethernet switches. At a minimum, the data plane parts of the S-GW and P-GW, namely, the S-GW-Dand the P-GW-D, and the packet routing part of the E-NodeB in the E-UTRAN require OpenFlow enhancements for GTP routing. Addi-tional enhancements for GTP routing may be needed on other switches within the EPC architecture depending on how much fine grained control over the routing an operator requires.”)

No.	’111 Patent Claim 27	Kempf

No.	’111 Patent Claim 28	Kempf
28	The method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet.	Kempf discloses the method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet. For example, Kempf discloses routing IP packets on an IP network. *See supra* at Claim 1. Kempf at [0003] (“The general packet radios system (GPRS) is a sys-tem that is used for transmitting Internet Protocol packets between user devices such as cellular phones and the Internet. The GPRS system includes the GPRS core network, which is an integrated part of the global system for mobile communi-cation (GSM). These systems are widely utilized by cellular phone network providers to enable cellular phone services over large areas.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.”)

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		Kempf at [0136] (“Characteristics of the GTP bearer are changed using a modify bearer request procedure. Such changes may, for example, include the QoS assigned to the IP packets. This procedure is used in a variety of EPC message sequences, for example, a UE triggered service request.”) Kempf at [0137] (“FIG. 21 is a diagram of one embodiment of the OpenFlow message sequence for the modify bearer request procedure. As with session creation, the EPC cloud control plane MME issues a modify bearer request message to the SGW-C and the SGW-C issues a modify bearer request mes-sage to the PGW-C. The PGW-C then optionally begins a policy and charging enforcement function (PCEF) initiated Internet Protocol connectivity access network (IP-CAN) ses-sion modification process with the PCRF. When this process completes, the PGW-C issues a GTP routing update RPC to the OpenFlow controller including the new bearer update information. The OpenFlow controller then issues GTP extended OpenFlow messages to the SGW-D, GxOFSes, and the PGW-D.”)

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29	The method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet.	Kempf discloses the method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet. For example, Kempf discloses routing TCP packets in a TCP network. *See supra* at Claim 28. Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing

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		matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0089] (“In one embodiment, the system implements a GTP fast path encapsulation virtual port. When requested by the S-GW-C and P-GW-C control plane software running in the cloud computing system, the OpenFlow controller programs the gateway switch to install rules, actions, and TEID hash table entries for routing packets into GTP tunnels via a fast path GTP encapsulation virtual port. The rules match the packet filter for the input side of GTP tunnel's bearer. Typi-cally this will be a 4 tuple of: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The IP source address and destination address are typically the addresses for user data plane traffic, i.e. a UE or Internet service with which a UE is transacting, and similarly with the port numbers. For a rule matching the GTP-U tunnel input side, the associated instructions and are the following: Write-Metadata (GTP-TEID, OxFFFFFFFF) Apply-Actions (Set-Output-Port GTP-Encap-VP”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are:

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		Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”)

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30[a]	The method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets;	Kempf discloses the method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets. For example, Kempf discloses communication between electronic devices in which additional data packets are sent from one electronic device to another destination device via the network elements. *See supra at* Claim 1, 1[c]. Kempf at [0003] (“The general packet radios system (GPRS) is a sys-tem that is used for transmitting Internet Protocol packets between user devices such as cellular phones and the Internet. The GPRS system includes the GPRS core network, which is an integrated part of the global system for mobile communi-cation (GSM). These systems are widely utilized by cellular phone network providers to enable cellular phone services over large areas.”) Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.”) Kempf at [0032] (“The techniques shown in the figures can be imple-mented using code and data stored and executed on one or more electronic devices (e.g., an end station, a network ele-ment, etc.). Such electronic devices store and communicate (internally and/or with other

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		electronic devices over a net-work) code and data using non-transitory machine-readable or computer-readable media, such as non-transitory machine-readable or computer-readable storage media (e.g., magnetic disks; optical disks; random access memory; read only memory; flash memory devices; and phase-change memory). In addition, such electronic devices typically include a set of one or more processors coupled to one or more other compo-nents, such as one or more storage devices, user input/output devices (e.g., a keyboard, a touch screen, and/or a display), and network connections. The coupling of the set of proces-sors and other components is typically through one or more busses and bridges (also termed as bus controllers). The stor-age devices represent one or more non-transitory machine-readable or computer-readable storage media and non-tran-sitory machine-readable or computer-readable communication media. Thus, the storage device of a given electronic device typically stores code and/or data for execu-tion on the set of one or more processors of that electronic device. Of course, one or more parts of an embodiment of the invention may be implemented using different combinations of software, firmware, and/or hardware.”) Kempf at [0033] (“As used herein, a network element (e.g., a router, switch, bridge, etc.) is a piece of networking equipment, including hardware and software, that communicatively interconnects other equipment on the network (e.g., other network elements, end stations, etc.). Some network elements are "multiple services network elements" that provide sup-port for multiple networking functions (e.g., routing, bridg-ing, switching, Layer 2 aggregation, session border control, multicasting, and/or subscriber management), and/or provide support for multiple application services (e.g., data, voice, and video). Subscriber end stations (e.g., servers, worksta-tions, laptops, palm tops, mobile phones, smart phones, mul-timedia phones, Voice Over Internet Protocol (VOIP) phones, portable media players, GPS units, gaming systems, set-top boxes (STBs), etc.) access content/services provided over the Internet and/or content/services provided on virtual private networks (VPN s) overlaid on the Internet. The content and/or services are typically provided by one or more end stations (e.g., server end stations) belonging to a service or content provider or end stations participating in a peer to peer service, and may include public web pages (free content, store fronts, search services, etc.), private web pages (e.g., username/pass-word accessed web pages providing email services, etc.), corporate networks over VPNs, IPTV, etc. Typically, sub-scriber end stations are coupled (e.g., through customer premise equipment coupled to an access network (wired or wirelessly)) to edge network elements,

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		which are coupled (e.g., through one or more core network elements to other edge network elements) to other end stations (e.g., server end stations).”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.”) Kempf at [0079] (“FIG. 16 is a diagram of one embodiment of a process for EPC peering and differential routing for specialized ser-vice treatment. The OpenFlow signaling, indicated by the solid lines and arrows 1601, sets up flow rules and actions on the switches and gateways within the EPC for differential routing. These flow rules direct GTP flows to particular loca-tions. In this example, the operator in this case peers its EPC with two other fixed operators. Routing through each peering point is handled by the respective P-GW-Dl and P-GW-D2 1603A, B. The dashed lines and arrows 1605 show traffic from a UE 1607 that needs to be routed to another peering operator. The flow rules and actions to distinguish which peering point the traffic should traverse are installed in the OpenFlow switches 1609 and gateways 1603A, B by the OpenFlow controller 1611. The OpenFlow controller 1611 calculates these flow rules and actions based on the routing tables it maintains for outside traffic, and the source and destination of the packets, as well as by any specialized for-warding treatment required for DSCP marked packets.”)
30[b]	checking, by the network node, if any one of the one or more additional packets satisfies the criterion;	Kempf discloses checking, by the network node, if any one of the one or more additional packets satisfies the criterion. *See supra at* Claim 1[d], 30[a].

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30[c]	responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity; and	Kempf discloses responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity. *See supra at* Claim 1[e], 30[a].
30[d]	responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction.	Kempf discloses responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction. *See supra at* Claim 1[f], 30[a].

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31[a]	The method according to claim 1, wherein the packet network is a Software Defined Network (SDN),	Kempf discloses the method according to claim 1, wherein the packet network is a Software Defined Network (SDN). For example, Kempf discloses a packet network using the OpenFlow protocol. A person of ordinary skill in the art would understand that the OpenFlow protocol is used in Software Defined Networks. *See supra* at Claim 1. Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.”)

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		Kempf at [0006] ("A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).") Kempf at [0007] ("A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane

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		functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”) Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The

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		enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”)
31[b]	the packet is routed as part of a data plane and	Kempf discloses the packet is routed as part of a data plane. For example, Kempf discloses routing packets on a data plane using a control protocol. Kempf at [0006] (“A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud

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		man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).”) Kempf at [0007] (“A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting

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		the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.") Kempf at [0038] ("Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC") Kempf at [0039] ("The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.") Kempf at [0040] ("The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.)

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		Kempf at [0041] (“The standard EPC control plane entities-the MME, PCRF, and HSS-are likewise deployed in the cloud, along with the control plane parts of the S-GW and P-GW, namely, the S-GW-C and the P-GW-C. The data plane con-sists of standard OpenFlow switches with enhancements as needed for routing GTP packets, rather than IP routers and Ethernet switches. At a minimum, the data plane parts of the S-GW and P-GW, namely, the S-GW-Dand the P-GW-D, and the packet routing part of the E-NodeB in the E-UTRAN require OpenFlow enhancements for GTP routing. Addi-tional enhancements for GTP routing may be needed on other switches within the EPC architecture depending on how much fine grained control over the routing an operator requires.”) Kempf at [0078] (“FIG. 15 is a diagram of one embodiment of how the EPC in the cloud computing system enables a managed ser-vices company to manage multiple operator networks out of a single data center. The managed services cloud computing facility 1501 runs separate instances of the EPC control plane for every mobile operator with which the managed services company has a contract. Each EPC instance is in a VPC 1503A,B that isolates the mobile operator's traffic from other tenants in the cloud computing facility 1501 of the data cen-ter. The EPC control plane instance for a mobile operator is connected to the mobile operator's geographically distributed EPC OpenFlow data plane switching fabric 1507 A,B and the mobile operator's base stations through a virtual edge router 1509A,B. The virtual edge router 1509A,B routes traffic from the data center to and from the appropriate mobile operator EPC data plane switching fabric 1507 A,B. In some cases, the mobile operators may even share base stations and EPC switching fabrics, though the example embodiment in FIG. 15 shows a case where the two mobile operators have separate switching fabrics.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions

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		depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0093] (“The virtual port simply removes the GTP tunnel header and forwards the enclosed user data plane packet out the bound physical port.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0145] (“In other embodiments, other control protocols can be utilized in place of OpenFlow as described herein. The use of OpenFlow is presented by way of example and not limita-tion. Other control protocols can also be utilized to manage the communication between the control plane and data plane and configuration of the data plane of the split EPC architec-ture. An example of such a protocol is FORCES, an IETF standard protocol for splitting the control plane and forward-ing plane in networks. The FORCES protocol specification is described in RFC 5810. RFC 5812 describes the architecture of a FORCES forwarding element, the equivalent of an Open-Flow switch. The FORCES protocol itself does not directly support programming routes into the forwarding element, it is, instead, a

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		framework for handling the interaction between the FORCES controller and a FORCES forwarding element. The forwarding element architecture describes how to design the protocol that actually allows a FORCES controller to program a FORCES forwarding element. One skilled in the art would understand that a FORCES based system could include features described herein above in relation to the OpenFlow embodiment, such as the GTP OpenFlow exten-sion, to allow the controller to program the switches for GTP TEID routing.")
31[c]	the network node communication with the controller serves as a control plane.	Kempf discloses the network node communication with the controller serves as a control. For example, Kempf discloses communication between network elements and an OpenFlow controller over a control plane. Kempf at [0006] ("A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control

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		protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).”) Kempf at [0007] (“A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”)

No.	’111 Patent Claim 31	Kempf
		Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0041] (“The standard EPC control plane entities-the MME, PCRF, and HSS-are likewise deployed in the cloud, along with the control plane parts of the S-GW and P-GW, namely, the S-GW-C and the P-GW-C. The data plane con-sists of standard OpenFlow switches with enhancements as needed for routing GTP packets, rather than IP routers and Ethernet switches. At a minimum, the data plane parts of the S-GW and P-GW, namely, the S-GW-Dand the P-GW-D, and the packet routing part of the E-NodeB in the E-UTRAN require OpenFlow enhancements for GTP routing. Addi-tional enhancements for GTP routing may be needed on other switches within the EPC architecture depending on how much fine grained control over the routing an operator requires.”)

No.	’111 Patent Claim 31	Kempf
		Kempf at [0078] (“FIG. 15 is a diagram of one embodiment of how the EPC in the cloud computing system enables a managed ser-vices company to manage multiple operator networks out of a single data center. The managed services cloud computing facility 1501 runs separate instances of the EPC control plane for every mobile operator with which the managed services company has a contract. Each EPC instance is in a VPC 1503A,B that isolates the mobile operator's traffic from other tenants in the cloud computing facility 1501 of the data cen-ter. The EPC control plane instance for a mobile operator is connected to the mobile operator's geographically distributed EPC OpenFlow data plane switching fabric 1507 A,B and the mobile operator's base stations through a virtual edge router 1509A,B. The virtual edge router 1509A,B routes traffic from the data center to and from the appropriate mobile operator EPC data plane switching fabric 1507 A,B. In some cases, the mobile operators may even share base stations and EPC switching fabrics, though the example embodiment in FIG. 15 shows a case where the two mobile operators have separate switching fabrics.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”)

No.	’111 Patent Claim 31	Kempf
		Kempf at [0093] (“The virtual port simply removes the GTP tunnel header and forwards the enclosed user data plane packet out the bound physical port.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0145] (“In other embodiments, other control protocols can be utilized in place of OpenFlow as described herein. The use of OpenFlow is presented by way of example and not limita-tion. Other control protocols can also be utilized to manage the communication between the control plane and data plane and configuration of the data plane of the split EPC architec-ture. An example of such a protocol is FORCES, an IETF standard protocol for splitting the control plane and forward-ing plane in networks. The FORCES protocol specification is described in RFC 5810. RFC 5812 describes the architecture of a FORCES forwarding element, the equivalent of an Open-Flow switch. The FORCES protocol itself does not directly support programming routes into the forwarding element, it is, instead, a framework for handling the interaction between the FORCES controller and a FORCES forwarding element. The forwarding element architecture describes how to design the protocol that actually allows a FORCES controller to program a FORCES forwarding element. One skilled in the art would understand that a FORCES based system could include features described herein above in relation to the OpenFlow embodiment, such as the GTP OpenFlow exten-sion, to allow the controller to program the switches for GTP TEID routing.”)

EXHIBIT D-2
Defendant's Preliminary Invalidity Contentions
Orckit Corporation v. Cisco Systems, Inc., 2:22-cv-00276-JRG-RSP

Chart for U.S. Patent 10,652,111 ("the '111 Patent")
U.S. Patent Publication No. 2013/0322242 to Swenson et al. ("Swenson")

As shown in the chart below, all Asserted Claims of the '111 Patent are invalid under (1) AIA-35 U.S.C. § 102 (a) because Swenson meets each element of those claims, and/or (2) 35 U.S.C. § 103 because Swenson renders those claims obvious either alone, or in combination with the knowledge of a person having ordinary skill in the art, and in further combination with the references specifically identified below and in the following claim chart and/or one or more references identified in Defendant's Preliminary Invalidity Contentions. The following quotations and diagrams come from Swenson titled "Real-Time Network Monitoring And Subscriber Identification With An On-Demand Appliance", which was filed on May 31, 2013, and published on December 5, 2013.

Motivations to combine the disclosures in Swenson with disclosures in other publications known in the art, as explained in this chart, include at least the similarity in subject matter between the references to the extent they concern methods relating to routing certain network traffic to entities for further analysis and inspection. Insofar as the references cite other patents or publications, or suggest additional changes, one of ordinary skill in the art would look beyond a single reference to other references in the field.

These invalidity contentions are based on Defendant's present understanding of the Asserted Claims, and Orckit's apparent construction of the claims in its November 3, 2022 Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1, and Orckit's January 19, 2023 First Amended Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1 (Orckit's "Infringement Disclosures"), which is deficient at least insofar as it fails to cite any documents or identify accused structures, acts, or materials in the Accused Products with particularity. Defendant does not agree with Orckit's application of the claims, or that the claims satisfy the requirements of 35 U.S.C. § 112. Defendant's contentions herein are not, and should in no way be seen as, admissions or adoptions as to any particular claim scope or construction, or as any admission that any particular element is met by any accused product in any particular way. Defendant objects to any attempt to imply claim construction from this chart. Defendant's prior art invalidity contentions are made in a variety of alternatives and do not represent Defendant's agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein.

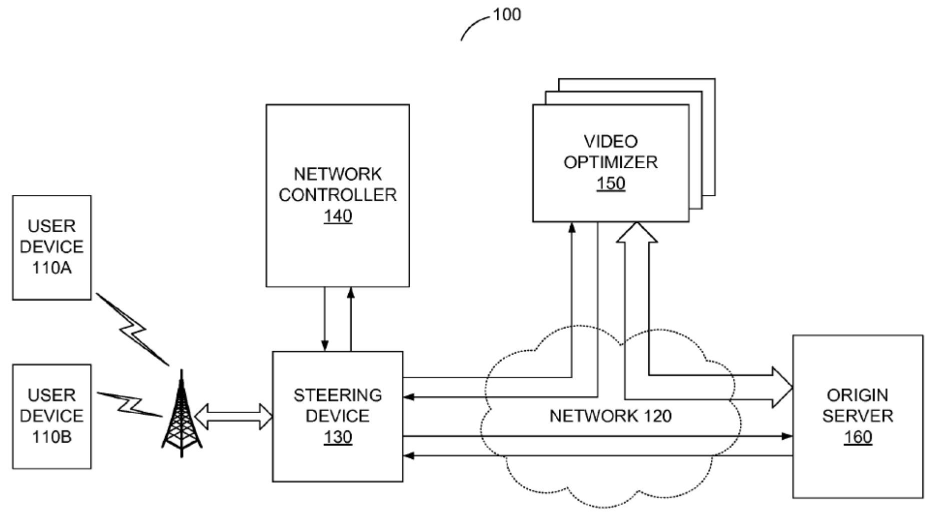
The following contentions are subject to revision and amendment pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules, and the Orders of record in this matter subject to further investigation and discovery regarding the prior art and the Court's construction of the claims at issue.

No.	'111 Patent Claim 1	Swenson
1[preamble]	A method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising:	Swenson discloses a method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising. For example, Swenson discloses a method for monitoring and steering traffic using a steering device that provides a gateway between user devices and servers under the control of an external network controller. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Swenson at Abstract ("A system and a method are disclosed for selectively monitor-ing traffic in a service provider network. The system receives a notice for a beginning of a network data flow, which responds to a request from a user device for content at an origin server. The system then determines whether to monitor the data flow from the origin server to the user device. If so determined, the system collects statistic information of the data flow and stores the statistic information to a flow record in a database. The system also maps the flow record to a subscriber of the service provider network by analyzing the statistic information of the data flow and estimates bandwidth provided to the data flow by the service provider's network based on the analysis of the statistic information of the data flow.") Swenson at [0018] ("Embodiments disclosed include a network control-ler system for real-time data gathering on the state of existing network traffic flows and mapping flow data to respective users in the network to predict available bandwidth and level of congestion. By gathering a history of flow statistics in the network, the network controller system establishes a relation-ship between base stations (or other network segments) and their capability to deliver the amount of data typically required by a particular user of the network. The very recent history of network flows can be used to predict the near future congestions in a substantially real-time fashion. Furthermore, the history of flow statistics can be used to build a long-term map of user behavior on the network, which can more effec-tively predict on demand data delivery requirements for the collection of users

No.	’111 Patent Claim 1	Swenson
		utilizing a given network access point in a consistent manner. The network controller keeps a flow state database, which groups flow data in a number of ways, such as on per station/cell tower, per subscriber, per time-of-day, or per geography area basis. As new flows are presented to the system for inspection, database can be queried to estimate the network congestion level for new flows to determine whether existing, new or future flows require optimizations in order to maintain the desired level of user satisfaction.”) Swenson at [0019] (“In one embodiment, an on-demand network moni-toring method is adopted to gather data about network flows as they traverse the network. For example, network flows can be monitored selectively or on-demand based on the types of the content carried in the flows. Furthermore, the network monitoring can also be performed selectively at inline level, as well as out-of-band to improve efficiency. Both TCP and UDP flows are monitored to gather information about the state of the network, such as the average network throughput for each flow and end-to-end latency between, for example, a client device and an origin server providing multimedia con-tent to the client device. For each TCP or UDP flow, the system tracks the number of bytes sent (and in some embodi-ments acknowledged). In TCP, the current window size may also be tracked. Records on network flows are stored in a flow statistics database, which can be indexed by subscriber iden-tification (ID), cell tower (base station), and network segment etc. As many flow records accumulate, this database repre-sents both historical and current network condition and capacity for delivering data. Network throughput can be mea-sured by calculating an average number of bytes delivered over a period of time. Steps may be taken to filter out spurious data from small flows with size less than a certain threshold that, when measured, cause very noisy results in measuring bandwidth and/or latency. For example, any flow having delivery time of less than 500 ms can be filtered.”) Swenson at [0023] (“FIG. 1 illustrates a high-level block diagram of an example communications environment 100 for selective on-demand real-time network monitoring and subscriber identi-fication. The environment 100 comprises user devices 110, an origin server 160, a steering device 130, a network controller 140, a video optimizer 150, and a network 120. The network 120 is a communication network that transmits data between the user devices 110, the steering device 130 and the origin server 160 and/or the video optimizer 150. In one embodi-ment the network 120 includes wireless network and the Internet.”)

No.	'111 Patent Claim 1	Swenson
		Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0045] ("The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are

No.	’111 Patent Claim 1	Swenson
		designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0056] (“FIGS. 4A and 4B each illustrates one embodiment of an example working mode of the network controller for providing selective on-demand real-time network monitoring and subscriber identification. Shown with the network con-troller 140 are the user device 110, the steering device 130, and the origin server 160. The network controller 140 is coupled to the steering device 130 through the steering device interface 316. In one embodiment, the network controller 140 and the steering device 130 communicate with each other using the Internet content adaption protocol (ICAP). The steering device interface 316 executes an ICAP server 406, which interacts with an ICAP client 404 running on the steer-ing device 130. Similar or different protocols may be used for communication between the network controller 140 and the steering device 130 in other embodiments.”) Swenson at Figure 1

No.	'111 Patent Claim 1	Swenson
		 FIG. 1
1[a]	sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion;	Swenson discloses sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion. For example, Swenson discloses sending instructions by the network controller to the steering device in which the steering device categorizes packet flows based on certain desired criteria or conditions. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140

No.	'111 Patent Claim 1	Swenson
		interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0027] ("However, information on the wireless/cellular user devices 110 side is often not available at the steering device 130 that sits between the cellular network and the wired Internet. For example, there is often no information about the identifiers of the towers associated with the mobile devices 110. Tower association information only broadcasted when the mobile devices first attached to the network. In addition, user devices 110 do not usually report any identification information except their IP addresses. Therefore, monitoring of the network traffic and detection of the congestion is auto-mated and managed by the detector 140 so that network can be optimized for end user's experience without the mobile user's knowledge.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.")

No.	’111 Patent Claim 1	Swenson
		Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”)

No.	'111 Patent Claim 1	Swenson
		Swenson at [0045] ("The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.") Swenson at [0073] ("FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.")
1[b]	receiving, by the network node from the controller, the instruction and the criterion;	Swenson discloses receiving, by the network node from the controller, the instruction and the criterion. *See supra at* 1[a].
1[c]	receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity;	Swenson discloses receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity. For example, Swenson discloses receiving network traffic flows from the user device at the steering device that is intended to be transmitted to the origin server. Swenson at [0005] ("Mobile devices, such as smart phones and tablets, have become prevalent in recent years. Given the fast advance in mobile computing power and far-reaching wireless Inter-net access, more and more users view streamed videos on their

No.	’111 Patent Claim 1	Swenson
		mobile devices. The detection of network congestion has become increasingly important for network operators attempting to maximize user experience on the network. Even as network operators are ever increasing the capacity of their networks, the demand for bandwidth is growing at an even faster pace. Managing network growth and dealing with con-gestion in the infrastructure is particularly important in the mobile space because of the high cost of radio spectrum and radio access network (RAN) equipment utilized by wireless mobile networks. These high costs prevent mobile service providers from engineering excess capacity into each net-work access point through the purchase of additional RAN infrastructure. The same situation can, however, also happens to other types of network infrastructure.”) Swenson at [0023] (“FIG. 1 illustrates a high-level block diagram of an example communications environment 100 for selective on-demand real-time network monitoring and subscriber identi-fication. The environment 100 comprises user devices 110, an origin server 160, a steering device 130, a network controller 140, a video optimizer 150, and a network 120. The network 120 is a communication network that transmits data between the user devices 110, the steering device 130 and the origin server 160 and/or the video optimizer 150. In one embodi-ment the network 120 includes wireless network and the Internet.”) Swenson at [0025] (“In one embodiment, the user devices 110 are com-puting devices with network capabilities. Oftentimes, for example, the user devices 110 are wireless enabled mobile computing device with a web browser and media display capability. The user devices 110 as mobile computing devices may include laptops, netbooks, tablets, smart telephones, or personal digital assistants (PDAs). While only two user devices HOA and HOB are illustrated in FIG. 1, the environ-ment 100 may include thousands or millions of such devices. The web browsers may be software applications running on mobile devices 110 for retrieving web content from the origin server 160 and presenting the web content on a display coupled to the mobile device. Web content accessed by the user devices 110 include text, images, audio and video con-tent. The multimedia content can be played back by the browsers, for example, HTML5 compatible browsers, plug-in or a standalone media player. The browsers can also invoke the media players or plug-ins available on the user

No.	’111 Patent Claim 1	Swenson
		devices 110 and passes images, audio and/or video to the media player or plug-in for playback.”) Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”)

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		Swenson at [0058] (“Referring now to FIG. 4A, network traffic flows from the user device 110 through the steering device 130 and arrive at the origin server 160 over the network request path. For example, a browser on the user device 110 may request web content from the origin server 160. A HTTP request message initiated at the user device 110 is forwarded to the steering device 130 over the network link 411. A data switch 402 inside the steering device 130 then relays the request message to the origin server 160 over the network link 412. On the opposite direction, network traffic originated from the origin server 160 flows through the steering device 130 back to the user device 110 over the network response path. For example, the origin server 160 responds to the user request by sending web content over the network link 413 to the steering device 130, which forwards the web content to the user device 110 over the network link 416. Note that the network links 411 and 416 are two opposite directions on the same physical link, so are the network link pair 414 and 415. On the other hand, the network link pair 412 and 413 may or may not share the same network path because traffic between the steering device 130 and origin server 160 on opposite directions may be routed differently over one or more routers.”)
1[d]	checking, by the network node, if the packet satisfies the criterion;	Swenson discloses checking, by the network node, if the packet satisfies the criterion. For example, Swenson discloses determining by the steering device packet flows that match one or more signatures, conditions, or criteria of the packet. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to

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		selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface

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		406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file

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		from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0079] (“In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology.

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		such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.")
1[e]	responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity; and	Swenson discloses responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity. For example, Swenson discloses monitoring and categorizing network traffic by the steering device based on instructions and desired criteria sent by the network controller to determine if packet flows require further inspection. Based on the instruction and desired criteria, the network controller monitors and optimizes only a subset of network traffic. Packet flows that do not meet the desired criteria from the network controller's instructions at the steering device are not sent for further inspection and are sent to their originally intended destination. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140

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		is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0042] (“The network controller 140 collects real-time statis-tical data on the network flows from core network side with-out probes deployed in the RAN network. The statistical data is stored and compared against historical flow data to estimate level of

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		congestion and available network bandwidth. Instead of collecting traffic statistics for every flow and every session, the network controller 140 samples only large flows involving media objects such as videos and images above a certain size (e.g., above 50 kB). The network controller 140 can choose to be a pass-through device to monitor the large flows as well as to determine whether to optimize the flows. Measuring only larger flows has the advantage to mitigate corruptions caused by origin server latency and network glitches. Furthermore, focusing on the large flows helps the network controller to reduce the background noise and to increase noise-to-signal ratio in bandwidth measuring by removing the impact of millions of tiny or small flows with delivery time in millisec-onds. Therefore the reliability of bandwidth estimation and congestion detection is much higher.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The

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		flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”)

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		Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)
1[f]	responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity.	Swenson discloses responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity. For example, Swenson discloses determining by the steering device monitors flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the packet to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of

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		network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0029] ("As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.")

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		Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and

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		images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In

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		one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.") Swenson at [0069] ("FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.")

No.	’111 Patent Claim 2	Swenson
2[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Swenson discloses the method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction. For example, Swenson discloses instructions sent by the network controller to the steering device instructions as to whether a packet flow should be ignored, monitored, or optimized. The monitoring and optimizing instructions may comprise forwarding packets/messages user device/origin server and/or the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be

No.	’111 Patent Claim 2	Swenson
		optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By

No.	’111 Patent Claim 2	Swenson
		monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0064] (“Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net-work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network

No.	’111 Patent Claim 2	Swenson
		controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

No.	’111 Patent Claim 2	Swenson
2[b]	upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller.	Swenson discloses upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller. For example, Swenson discloses in response to detected traffic congestion, the steering device stops receiving data from the user device or origin server and does not forward any data to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be

No.	’111 Patent Claim 2	Swenson
		optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”)

No.	’111 Patent Claim 3	Swenson
3[a]	The method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction, and	Swenson discloses the method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction. *See supra* at 2(a).

No.	’111 Patent Claim 3	Swenson
3[b]	upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller.	Swenson discloses upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller. For example, Swenson discloses a counting mode instructed by the network controller to the steering device for monitoring and optimizing, in which the steering device forwards the packet flow to the user device/origin server and at the same time, sending the packet flow to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media

No.	’111 Patent Claim 3	Swenson
		requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0064] (“Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net-work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”)

No.	'111 Patent Claim 3	Swenson
		Swenson at [0071] ("After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.") Swenson at [0072] ("In one embodiment, if the video optimizer 150 failed to retrieve user requested video file from the origin server 160, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 624, which is intercepted by the steering device 130 only. The steering device 130 forwards the video to the user device 110 and at the same time reports the flow size to the network controller 140 for monitoring purpose.")

No.	'111 Patent Claim 4	Swenson
4[a]	The method according to claim 1, wherein the instruction is 'probe', 'mirror', or 'terminate' instruction, and	Swenson discloses the method according to claim 1, wherein the instruction is 'probe', 'mirror', or 'terminate' instruction. *See supra* at 2(a).

No.	’111 Patent Claim 4	Swenson
4[b]	upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller;	Swenson discloses upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller. For example, Swenson discloses determining by the steering device flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the packet to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be

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		optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection

No.	’111 Patent Claim 4	Swenson
		to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller

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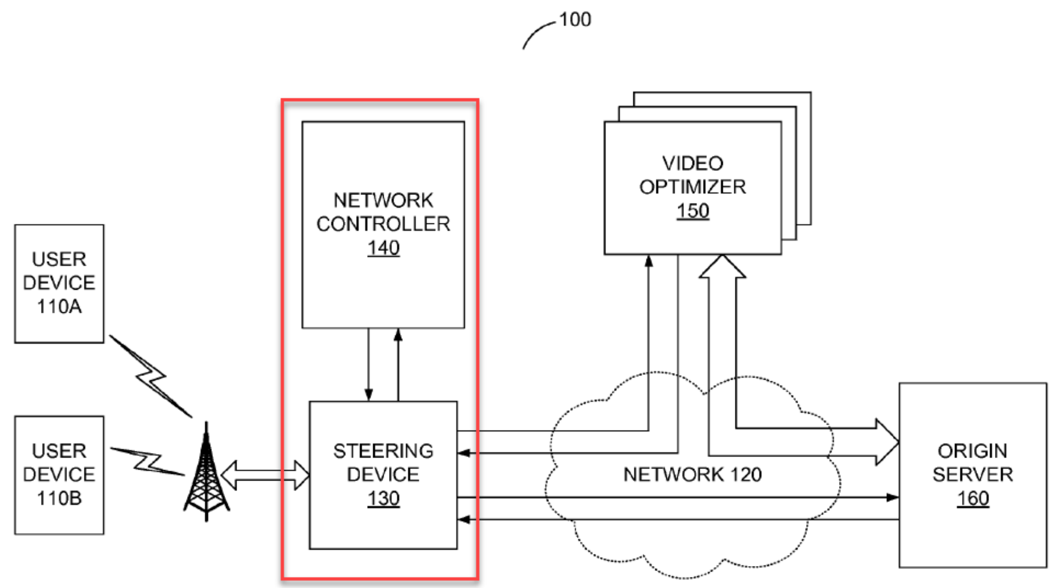
		140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.") Swenson at [0065] ("FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.") Swenson at [0069] ("FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which

No.	’111 Patent Claim 4	Swenson
		inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)

No.	’111 Patent Claim 4	Swenson
		 **FIG. 1**
4[c]	responsive to receiving the packet, analyzing the packet, by the controller;	Swenson discloses responsive to receiving the packet, analyzing the packet, by the controller. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140

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		interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The

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		network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of "reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example,

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		the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0060] ("If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.") Swenson at [0061] ("Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of

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		interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this

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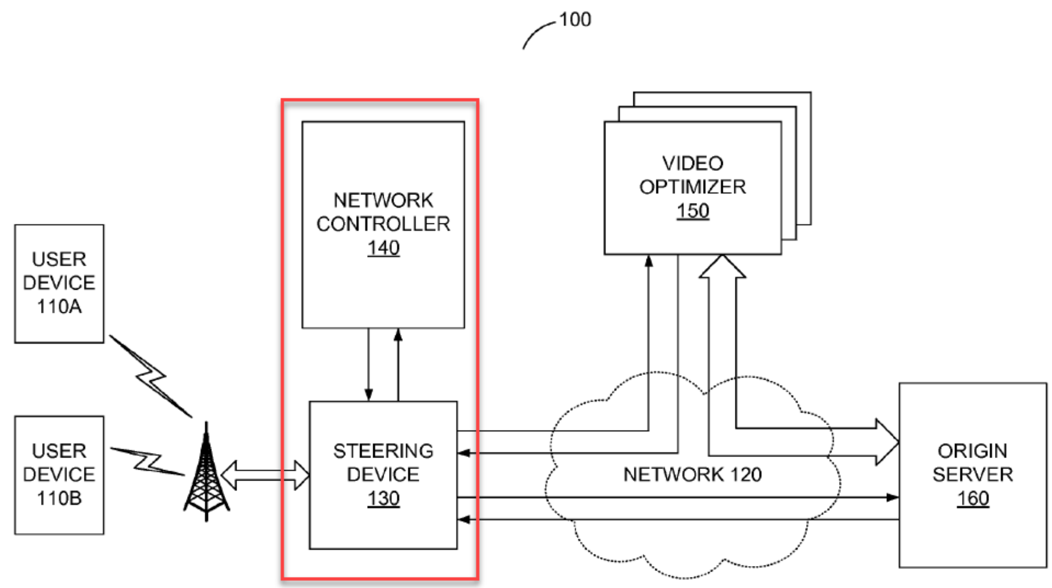
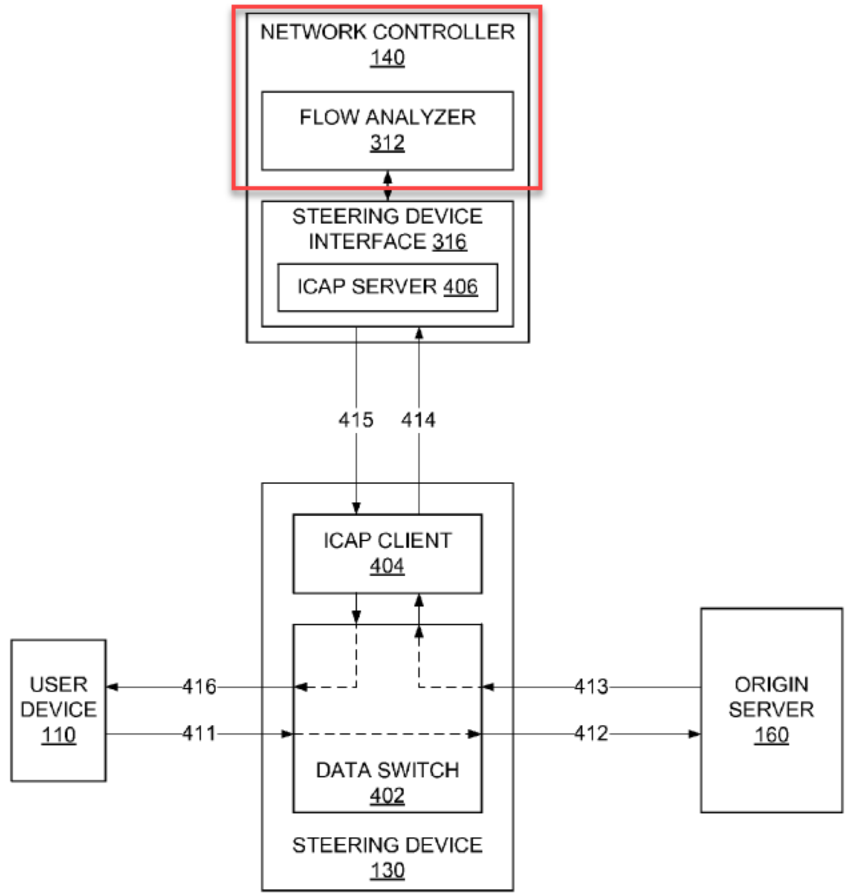
		case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)

No.	’111 Patent Claim 4	Swenson
		 FIG. 1 Swenson at Figure 4A (annotation added)

No.	'111 Patent Claim 4	Swenson
		 FIG. 4A
4[d]	sending the packet, by the controller, to the network node; and	Swenson discloses sending the packet, by the controller, to the network node.

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		For example, Swenson discloses sending the packet, for example a video or image, back to the steering device after the network controller analyzes the packet and updates flow statistics. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.")

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		Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0057] (“The Internet content adaption protocol is a light-weight protocol aimed at executing a simple remote proce-dure call on HTTP messages. ICAP leverages edge-based devices to help deliver value-added services using transparent HTTP proxy caches. Content adaptation refers to performing the particular value added service, such as content manipula-tion or other processing, for the associated HTTP client request/response. ICAP clients pass HTTP messages to ICAP servers for transformation or other processing. In tum, the ICAP server executes its transformation service on the HTTP messages and sends back responses to the ICAP client. At the core of this process is a cache that can proxy all client trans-actions and process them through ICAP servers, which may focus on specific functions, such as ad insertion, virus scan-ning, content translation, language translation, or content fil-tering. ICAP servers, such as those utilized by the network controller 140, handle these tasks to off-load value-added services from network devices including an ICAP client, such as the steering device 130. By offloading value added services from the steering device 130, processing infrastructure (e.g., optimization services and network controllers) may be scaled independent from the steering devices handling raw HTTP throughput.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface

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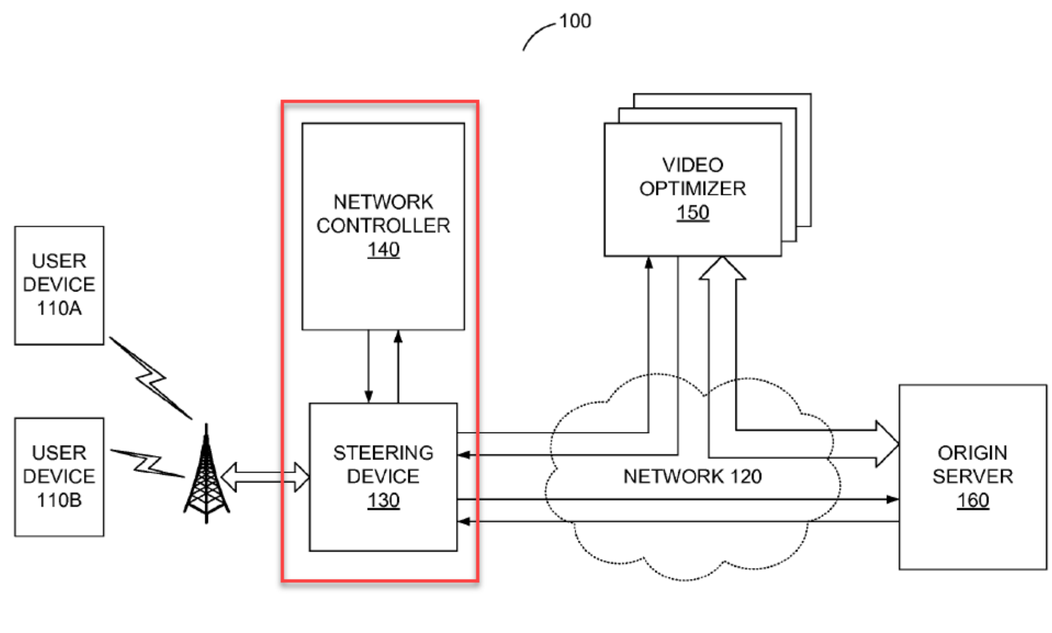
		406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0060] ("If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.") Swenson at [0071] ("After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.")

No.	’111 Patent Claim 4	Swenson
		Swenson at Figure 1 (annotation added)  FIG. 1
4[e]	responsive to receiving the packet, sending the packet, by the network node, to the second entity.	Swenson discloses responsive to receiving the packet, sending the packet, by the network node, to the second entity. For example, Swenson discloses sending the packet, for example a video or image, back to the steering device after the network controller analyzes the packet and updates flow statistics. Swenson further discloses the steering device, upon having the packet returned to it, transmitting the packet to the destination entity, for example, the user device or origin server.

No.	’111 Patent Claim 4	Swenson
		Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing,

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		geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0057] (“The Internet content adaption protocol is a light-weight protocol aimed at executing a simple remote proce-dure call on HTTP messages. ICAP leverages edge-based devices to help deliver value-added services using transparent HTTP proxy caches. Content adaptation refers to performing the particular value added service, such as content manipula-tion or other processing, for the associated HTTP client request/response. ICAP clients pass HTTP messages to ICAP servers for transformation or other processing. In tum, the ICAP server executes its transformation service on the HTTP messages and sends back responses to the ICAP client. At the core of this process is a cache that can proxy all client trans-actions and process them through ICAP servers, which may focus on specific functions, such as ad insertion, virus scan-ning, content translation, language translation, or content fil-tering. ICAP servers, such as those utilized by the network controller 140, handle these tasks to off-load value-added services from network devices including an ICAP client, such as the steering device 130. By offloading value added services from the steering device 130, processing infrastructure (e.g., optimization services and network controllers) may be scaled independent from the steering devices handling raw HTTP throughput.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The

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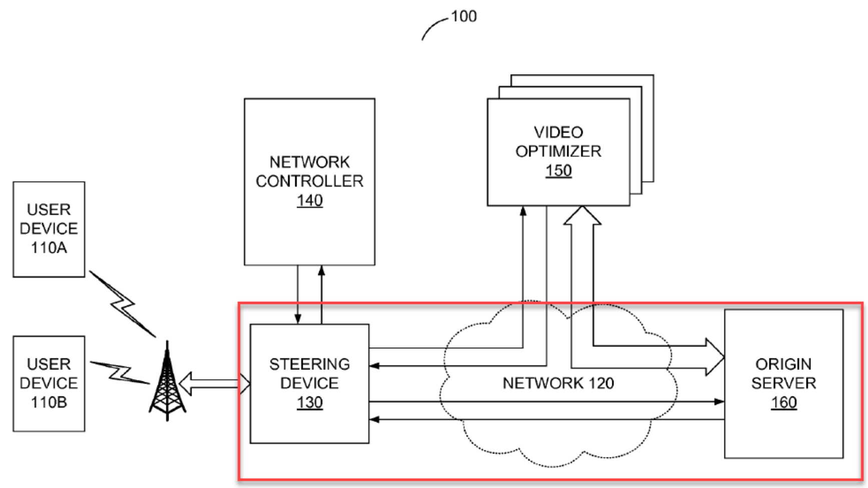
		flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)

No.	’111 Patent Claim 4	Swenson
		 FIG. 1

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5	The method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller.	Swenson discloses the method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller. For example, Swenson discloses determining by the steering device flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected, the steering device forwards the HTTP request and a portion of the HTTP response to the network controller. *See supra* at Claim 1. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the

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		user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the

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		radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.") Swenson at [0045] ("The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.") Swenson at [0059] ("In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0061] ("Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller

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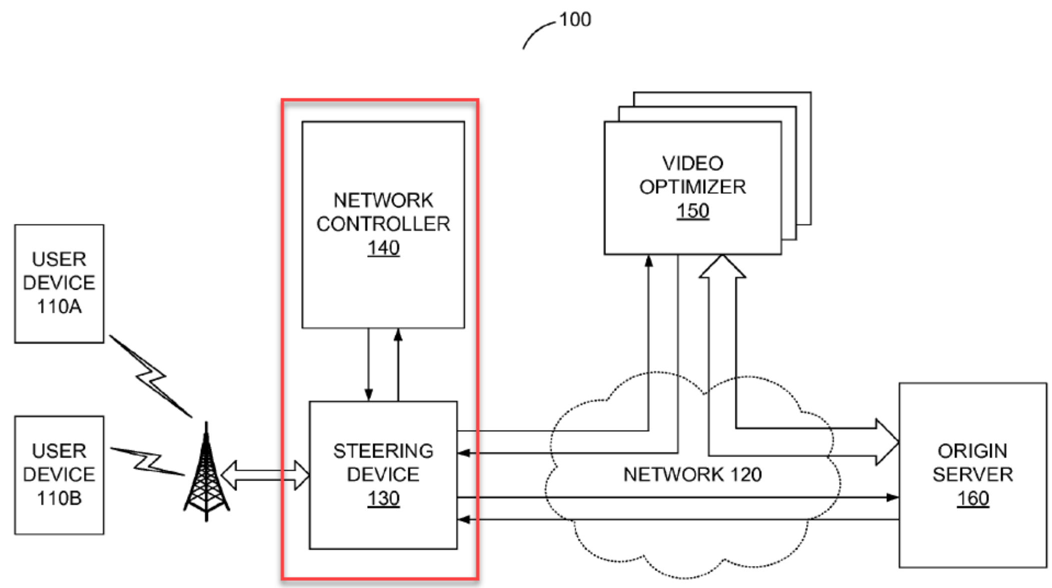
		140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”)

No.	'111 Patent Claim 5	Swenson
		Swenson at [0069] ("FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.") Swenson at Figure 1 (annotation added)

No.	’111 Patent Claim 5	Swenson
		 FIG. 1

No.	’111 Patent Claim 6	Swenson
6	The method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory.	Swenson discloses the method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory. For example, Swenson discloses the network controller storing historical network traffic data based on received packet flows. *See supra* at Claim 5. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user

No.	’111 Patent Claim 6	Swenson
		device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it

No.	’111 Patent Claim 6	Swenson
		is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0044] (“Additionally, historical flow data over a longer term helps the flow analyzer 312 to determine repeating patterns and heat-maps of certain network sections and to predict when they are under congestion. In this case, the flow statis-tics stored in the flow cache 322 can be mapped against traffic categories for analysis, for example, long-term running aver-ages of video flow bandwidth help determine suitability for optimization. Furthermore, estimated bandwidth per user (or per cell-ID, per tower, or per router) over time may be metrics calculated by the flow analyzer 312 in order to determine short term needs for optimization. For example, the flow analyzer 312 may determine to being optimizing flows asso-ciated with a particular cell-ID (or those flows for identified high-bandwidth users on the cell-ID) in response to a thresh-old number of high-bandwidth users connecting to a same cell tower corresponding to the cell-ID. The reason why flow analyzer 312 selectively monitors large flows lies in the real-ization that TCP statistics for small objects, which make up most web flows, can be misleading and cause huge errors in throughput estimations.”) Swenson at [0046] (“The flow cache 322 stores monitored flow informa-tion, which is updated for a flow with each associated trans-action from the steering device 13 0. In one embodiment, data in the flow cache is stored in a map indexed by a hash, which can be up to 64-bit or longer. An entry in the flow cache map may be organized as a linked list to allow hash collisions. Alternatively, fewer bits in the hash index can also be used to speed up binary search in the flow cache map. For example, instead of using 64-bit hash index, which requires at worst 64 steps to find a node, the hash index can be reduced to 16-24 bits. There will be more hash collisions, hence the longer linked list. Other embodiments may use other type of maps or binary trees instead of the linked list to further optimize the hash collision searches.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images.

No.	'111 Patent Claim 6	Swenson
		When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0061] ("Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.")

No.	’111 Patent Claim 7	Swenson
7	The method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.	Swenson discloses the method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller. For example, Swenson discloses determining by the steering device flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the HTTP request and a portion of the HTTP response to the network controller. *See supra* at Claim 5. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may

No.	’111 Patent Claim 7	Swenson
		determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the

No.	'111 Patent Claim 7	Swenson
		flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.") Swenson at [0065] ("FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain

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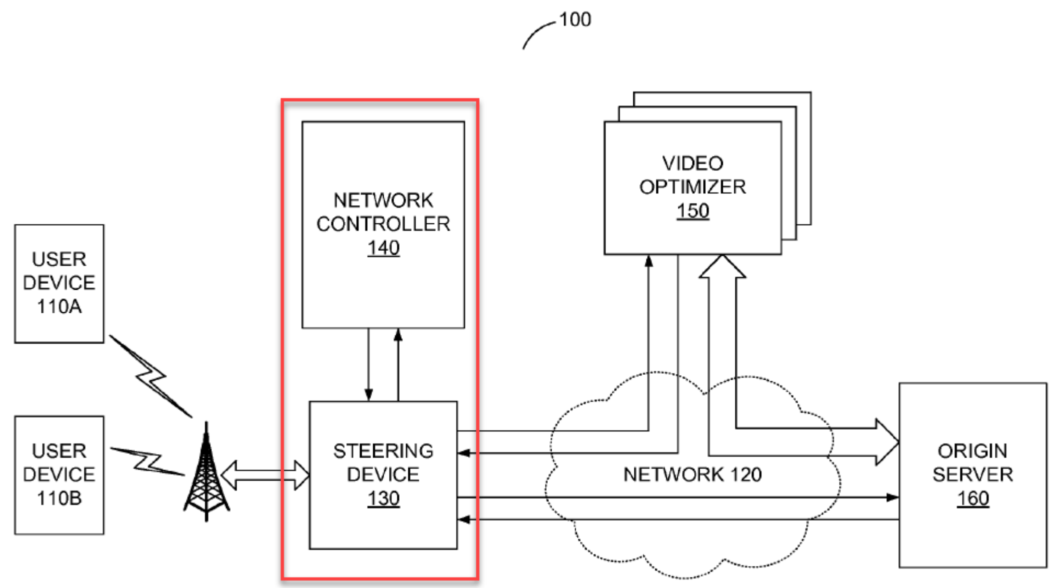
		video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at Figure 1 (annotation added)

No.	'111 Patent Claim 7	Swenson
		 **FIG. 1**

No.	'111 Patent Claim 8	Swenson
8[a]	The method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes, and	Swenson discloses the method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes. For example, Swenson discloses determining by the steering device flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the a next portion of the flow payload to the network controller that consists of a number of bytes. *See supra* at Claim 7.

No.	'111 Patent Claim 8	Swenson
		Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0061] ("Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller

No.	'111 Patent Claim 8	Swenson
		140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.") Swenson at [0065] ("FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.")

No.	’111 Patent Claim 8	Swenson
		Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)
8[b]	wherein the instruction comprises identification of the consecutive bytes in the packet.	Swenson discloses wherein the instruction comprises identification of the consecutive bytes in the packet. For example, Swenson discloses determining by the steering device flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device identifies and forwards a next portion of the flow payload to the network controller that consists of a number of bytes. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of

No.	’111 Patent Claim 8	Swenson
		network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the

No.	’111 Patent Claim 8	Swenson
		congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the

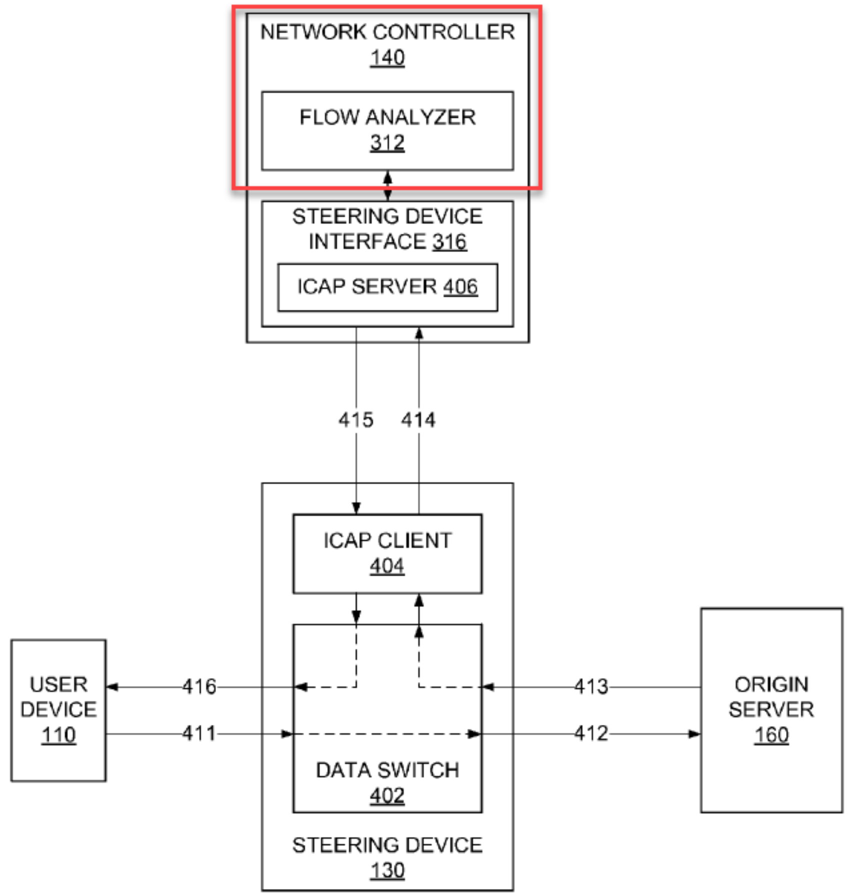
No.	’111 Patent Claim 8	Swenson
		intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

No.	’111 Patent Claim 9	Swenson
9	The method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller.	Swenson discloses the method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. *See supra* at Claim 5. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”)

No.	’111 Patent Claim 9	Swenson
		Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”)

No.	’111 Patent Claim 9	Swenson
		Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP

No.	’111 Patent Claim 9	Swenson
		response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at Figure 4A (annotation added)

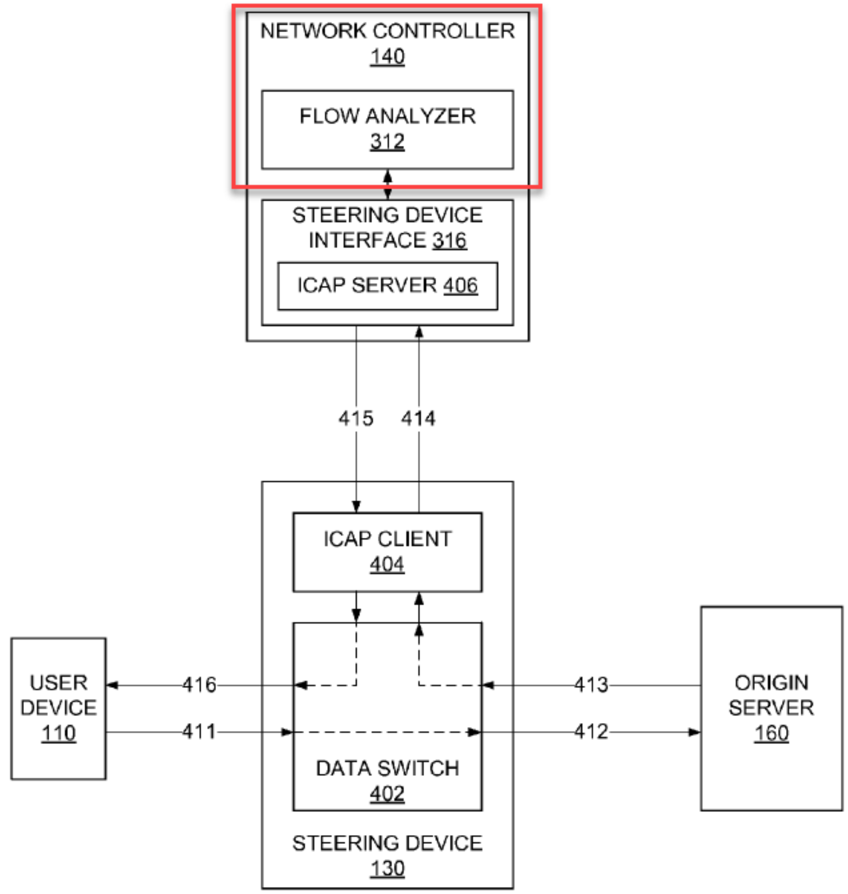
No.	'111 Patent Claim 9	Swenson
		 FIG. 4A

No.	'111 Patent Claim 12	Swenson
12	The method according to claim 9, wherein the analyzing comprises applying security or data analytic application.	Swenson discloses the method according to claim 9, wherein the analyzing comprises applying security or data analytic application. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. Swenson further discloses other conventional components such as security functions are included in the network controller. *See supra* at Claim 9. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should

No.	’111 Patent Claim 12	Swenson
		be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface.

No.	’111 Patent Claim 12	Swenson
		404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The

No.	’111 Patent Claim 12	Swenson
		steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at Figure 4A (annotation added)

No.	'111 Patent Claim 12	Swenson
		 FIG. 4A

No.	’111 Patent Claim 13	Swenson
13	The method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality.	Swenson discloses the method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. Swenson further discloses other conventional component such as security functions, which may be a firewall or intrusion detection engine, are included in the network controller. *See supra* at Claim 9. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may

No.	’111 Patent Claim 13	Swenson
		determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and

No.	’111 Patent Claim 13	Swenson
		a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the

No.	’111 Patent Claim 13	Swenson
		intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

No.	’111 Patent Claim 14	Swenson
14	The method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet.	Swenson discloses the method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet. For example, Swenson discloses the network controller comprising a flow analyzer performing a deep flow inspection on the packet flow. *See supra* at Claim 9. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”)

No.	’111 Patent Claim 14	Swenson
		Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”)

No.	’111 Patent Claim 14	Swenson
		Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP

No.	’111 Patent Claim 14	Swenson
		response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

No.	’111 Patent Claim 15	Swenson
15[a]	The method according to claim 9, wherein the packet comprises distinct header and payload fields, and	Swenson discloses the method according to claim 9, wherein the packet comprises distinct header and payload fields. For example, Swenson discloses packet flows with header and payload fields. *See supra* at Claim 9.

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		Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0049] (“The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the

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		flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0064] (Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net- work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”)

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		Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain

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		video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0079] (“In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not

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		available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)
15[b]	wherein the analyzing comprises checking part of, or whole of, the payload field.	Swenson discloses wherein the analyzing comprises checking part of, or whole of, the payload field. For example, Swenson discloses defining optimization policies based on analysis of HTTP payload field of the packet by the flow analyzer of the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with

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		which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0049] (“The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”)

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		Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain

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		video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

No.	’111 Patent Claim 16	Swenson
16[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Swenson discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
16[b]	the header comprises one or more flag bits, and	Swenson discloses the header comprises one or more flag bits. For example, Swenson packet flow header fields in which may include flags, such as a “do not transcode” flag. A person of ordinary skill in the art would understand that a header may be comprised of specific flag bits. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Swenson is found to not meet this limitation the header comprises one or more flag bits would have been obvious to a person having ordinary skill in the art, as explained below. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”)

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		Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0068] (“In one embodiment, responsive to an HTTP get request 522 to an origin server 160, the video optimizer receives a HTTP 404 error from the origin server 160 as opposed to a video file. In such case, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 524, which is intercepted by the steering device 130 and the inline on-demand element the network controller 140 for monitoring purpose.”) Swenson at [0072] (“In one embodiment, if the video optimizer 150 failed to retrieve user requested video file from the origin server 160, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 624, which is intercepted by the steering device 130 only. The steering device 130 forwards the video to the user device 110 and at the same time reports the flow size to the network controller 140 for monitoring purpose.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Swenson in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

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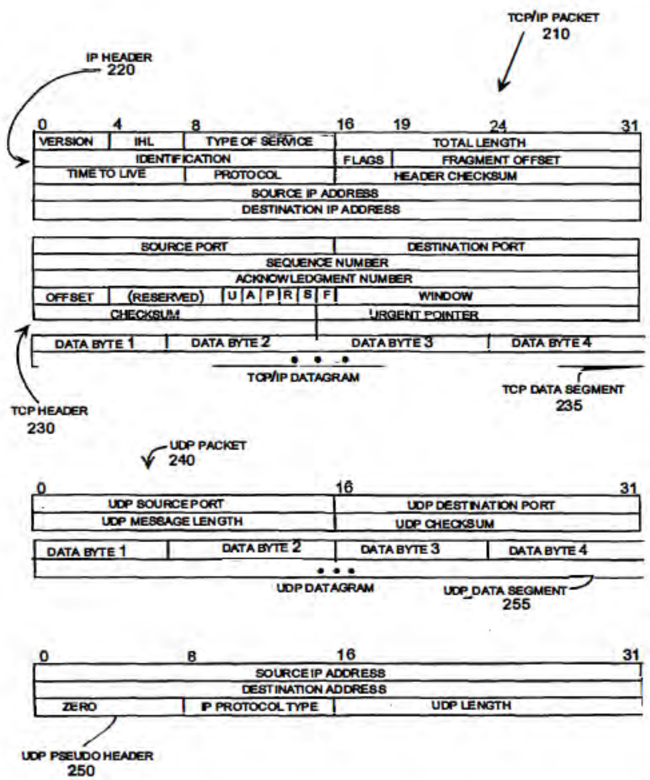
		For example, Copeland discloses packet headers with flag bits. Copeland at Figure 2  PACKET HEADERS FIG. 2 Copeland at [0076] (“FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a

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		data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.”) Copeland at [0077] (“The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.”) Copeland at [0078] (“In regards to a typical IP packet 210, the first 4 bits of the IP header 220 identify the Internet protocol (IP) version. The following 4 bits identify the IP header length in 32 bit words. The next 8 bits differentiate the type of service by describing how the packet should be handled in transit. The following 16 bits convey the total packet length.”) Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP

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		buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0083] (“Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.”) Copeland at [0116] (“These steps generally require manipulations of quantities such as IP addresses, packet length, header length, start times, end times, port numbers, and other packet related information. Usually, though not necessarily, these quanti-ties take the form of electrical, magnetic, or optical signals capable of being stored, transferred, combined, compared, or otherwise manipulated. It is conventional for those skilled in the art to refer to these signals as bits, bytes, words, values, elements, symbols, characters, terms, numbers, points, records, objects, images, files or the like. It should be kept in mind, however, that these and similar terms should be associated with appropriate quantities for computer opera-tions and that these terms are merely conventional labels applied to quantities that exist within and during operation of the computer.”) As another example, Kempf discloses packet headers with flag bits. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-

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		Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”)

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		Kempf at [0092] ("In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.") Kempf at [0094] ("In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).") Kempf at [0098] ("The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.")

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		Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_
		teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenFlow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		struct ermst_gtp_mask {
		uint32_t gtp_wildcard;
		uint16_t gtp_flag_mask;
		};
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

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16[c]	wherein the packet-applicable criterion is that one or more of the flag bits is set.	Swenson discloses wherein the packet-applicable criterion is that one or more of the flag bits is set. For example, Swenson discloses one or more signatures, desired criteria, or conditions of the packet flow used by the steering device to determine the categorization of network traffic which may include one or more flag bits of the header is set. A person of ordinary skill in the art would understand that one or more signatures, desired criteria, or conditions of the packet flow could be that one or more of the flag bits is set. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Swenson is found to not meet this limitation, wherein the packet applicable criterion is that one or more of the flag bits is set would have been obvious to a person having ordinary skill in the art, as explained below. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with

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		which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0068] (“In one embodiment, responsive to an HTTP get request 522 to an origin server 160, the video optimizer receives a HTTP 404 error from the origin server 160 as opposed to a video file. In such case, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 524, which is intercepted by the steering device 130 and the inline on-demand element the network controller 140 for monitoring purpose.”) Swenson at [0072] (“In one embodiment, if the video optimizer 150 failed to retrieve user requested video file from the origin server 160, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 624, which is intercepted by the steering device 130 only. The steering device 130 forwards the video to the user device 110 and at the same time reports the flow size to the network controller 140 for monitoring purpose.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Swenson in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[c] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet specific characteristics including flag bits that are set. Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit

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		acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0083] (“Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”) Copeland at [0125] (“For purposes of the description, which follows, the IP address with the lower value, when considered as a 32-bit unsigned integer, is designated ip[0] and the corresponding port number is designated pt[0]. The higher IP address is designated ip[l] and the corresponding TCP or UDP port number is designated pt[l]. At some point, either pt[0] or pt[l] may be designated the "server" port by setting an appropriate bit in a bit map that is part of the flow record (record "state", bit 1 or 2 is set).”)

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		Copeland at [0145] (“A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.”) As another example, Kempf flow table matches in which the flag bits is set. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0);

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		Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255)

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		while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

<table>
<tr><th>No.</th><th>’111 Patent Claim 16</th><th>Swenson</th></tr>
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Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenF!ow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:

struct ermst_gtp_mask {
  uint32_t gtp_wildcard;
  uint16_t gtp_flag_mask;
};

Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

Kempf at Figure 10
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		(FIG. 10, below)

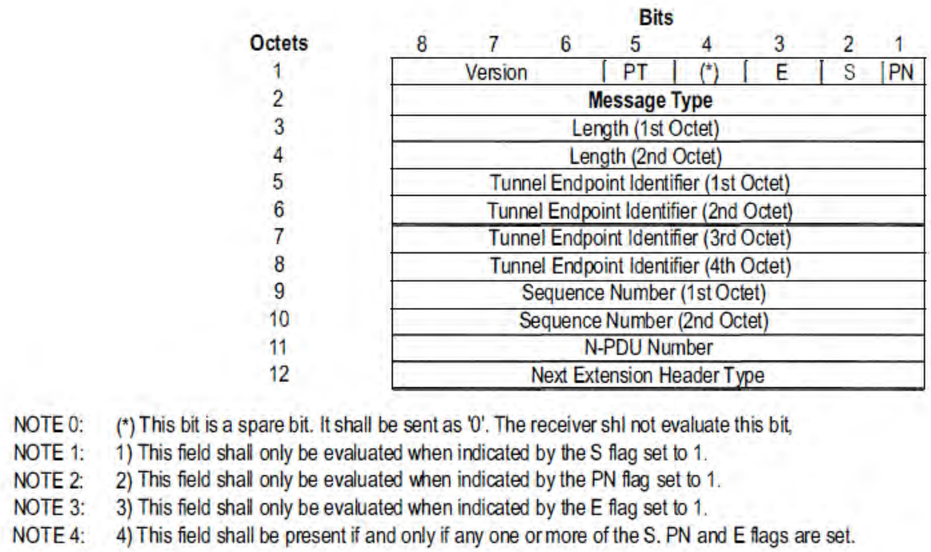

FIG. 10

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17[a]	The method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet, and	Swenson discloses the method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet. For example, Swenson discloses TCP packet flows. *See supra* at Claim 16. Swenson at [0019] (“ In one embodiment, an on-demand network moni-toring method is adopted to gather data about network flows as they traverse the network. For example, network flows can be monitored selectively or on-demand based on the types of the content carried in the flows. Furthermore, the network monitoring can also be performed selectively

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		at inline level, as well as out-of-band to improve efficiency. Both TCP and UDP flows are monitored to gather information about the state of the network, such as the average network throughput for each flow and end-to-end latency between, for example, a client device and an origin server providing multimedia con-tent to the client device. For each TCP or UDP flow, the system tracks the number of bytes sent (and in some embodi-ments acknowledged). In TCP, the current window size may also be tracked. Records on network flows are stored in a flow statistics database, which can be indexed by subscriber iden-tification (ID), cell tower (base station), and network segment etc. As many flow records accumulate, this database repre-sents both historical and current network condition and capacity for delivering data. Network throughput can be mea-sured by calculating an average number of bytes delivered over a period of time. Steps may be taken to filter out spurious data from small flows with size less than a certain threshold that, when measured, cause very noisy results in measuring bandwidth and/or latency. For example, any flow having delivery time of less than 500 ms can be filtered.”) Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering

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		device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0044] (“Additionally, historical flow data over a longer term helps the flow analyzer 312 to determine repeating patterns and heat-maps of certain network sections and to predict when they are under congestion. In this case, the flow statis-tics stored in the flow cache 322 can be mapped against traffic categories for analysis, for example, long-term running aver-ages of video flow bandwidth help determine suitability for optimization. Furthermore, estimated bandwidth per user (or per cell-ID, per tower, or per router) over time may be metrics calculated by the flow analyzer 312 in order to determine short term needs for optimization. For example, the flow analyzer 312 may determine to being optimizing flows asso-ciated with a particular cell-ID (or those flows for identified high-bandwidth users on the cell-ID) in response to a thresh-old number of high-bandwidth users connecting to a same cell tower corresponding to the cell-ID. The reason why flow analyzer 312 selectively monitors large flows lies in the real-ization that TCP statistics for small objects, which make up most web flows, can be misleading and cause huge errors in throughput estimations.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the

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		network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0062] (“ Based on the flow statistics stored in the flow cache 322, the network controller 140 can also aggregate the flows associated with a user or subscriber in order to estimate the total available bandwidth occupied by the user or subscriber. In one embodiment, the network controller 140 tracks all the flow cache entries looking for flows originated from a com-mon source IP address or a user device identifier. The flow analyzer 312 of the network controller 140 then attempts to group these flows together to form a flow history for the user or subscriber. The network controller further identifies users or subscribers using two data components in the flow cache entry: the TCP source port and HTTP cookies associated with the flow. Together with the flow history, the network control-ler 140 establish pattern, and identify users or subscribers and stores subscriber information in the subscriber log 324. More details of the flow cache and user mapping are described below with reference to FIG. 7.”) Swenson at [0084] (“The flow analyzer 312 can also map flows to users (subscribers to the mobile or network service) in the flow cache entries by matching cookie hashes, MAC address (or any unique device identifiers), or TCP source ports. For example, if two flows share the same source port, it is very likely that they belong to the same user because TCP ports are reused often by an individual user, but not often between users. Furthermore, source ports can also be used to map users when network address translation (NAT) is deployed. In a typical network with NAT configuration, each user is allo-cated a block (e.g., 32) of TCP source ports. A random port number within the block is then picked for each

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		new user flows initiated. With this knowledge, all source ports within a block can be aggregated under the same user. In some cases, a user with more than one block of port number assigned, the cookie hashes can be used to link the blocks together.”)
17[b]	wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof.	Swenson discloses wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. For example, Swenson discloses headers that may include flag bits. A person of ordinary skill in the art would understand that such flag bits may be a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Swenson is found to not meet this limitation, wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof would have been obvious to a person having ordinary skill in the art, as explained below. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Swenson in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 17[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

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		For example, Copeland discloses TCP packets with flag bits including SYN, ACK, FIN, and R flag bits. Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”) Copeland at [0090] (“Host2 responds with a SYN-ACK packet. In this message, both the SYN flag and the ACK flag are set. Host2 provides the initial sequence number for its data to Hostl. Host2 also sends to Hostl the acknowledgment number that is the next sequence number Host2 expects to receive from host 1. In the SYN-ACK packet sent by Host2, the

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		acknowl-edgment number is the initial sequence number of Hostl plus 1, which should be the next sequence number received.”) Copeland at [0091] (“Hostl responds to the SYN-ACK with a packet with just the ACK flag set. Hostl acknowledges that the next packet of information received from Host2 will be Host2's initial sequence number plus 1. The three-way handshake is complete and data is transferred.”) Copeland at [0092] (“Host2 responds to ACK packet with its own ACK packet. Host2 acknowledges the data it has received from Hostl by sending an acknowledgment number one greater than its last received data sequence number. Both hosts send packets with the ACK flag set until the session is to end although the P and U flags may also be set, if warranted.”) Copeland at [0093] (“As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.”) Copeland at [0094] (“Host2 acknowledges the FIN packet by sending its own ACK packet. The ACK packet has the acknowledge-ment number one greater than the sequence number of Hostl's FIN-ACK packet. ACK packets are still delivered between the two hosts, except that HOSTl's packets have no data appended to the TCP/IP end of the headers.”) Copeland at [0095] (“When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.”) As another example, Uchida discloses the TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag. Uchida at [0040] (“A flow end can be detected by various methods as below. For example, in one method, a protocol end message is checked. For example, in the TCP (Transmission

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		Control Protocol), a FIN flag is checked. In this way, the end of communication, that is, the end of a flow using communica-tion, can be detected. In practice, after a FIN flag, communi-cation with an ACK packet is generated in a reverse-direction flow (a flow in which the source and the destination are reversed). Thus, by detecting the ACK flag in the reverse-direction flow after the FIN packet, a flow end can be deter-mined. Further, since the TCP is used in bidirectional com-munication, the forward- and reverse-direction flows can be used as a pair to determine a flow end. Namely, if the end of a flow is detected, a process rule corresponding to the reverse-direction flow of the flow can also be determined to be unnec-essary. Alternatively, a communication end can also be deter-mined when a predetermined time elapses after reception of a SYN packet and a timeout is determined. Still alternatively, a communication end can be determined by reception of a RST packet. These methods will be described in more detail later as specific examples.") Uchida at [0050] ("The flow end check unit can use at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag extracted by the end determination information extraction unit to determine a flow end.") Uchida at [0055] ("In the process rule update method, a flow end can be determined by at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag.") Uchida at [0102] ("Next, specific examples 1 to 3 will be described. In the examples 1 to 3, a flow end is determined by combining features of the above individual exemplary embodiments and using TCP (Transmission Control Protocol) flags.") Uchida at [0103] ("FIG. 6 is a state transition diagram of TCP connec-tion. "CLOSED" at the top of FIG. 6 represents the end of TCP communication, and portions connected thereto repre-sent states prior to the end of TCP communication. Approxi-mately 2MSL (MSL: Maximum Segment Lifetime) is the maximum amount of time required to reach the above "CLOSED," that is, if the packet forwarding apparatus stands by for approximately 2MSL after both FINs flow, the above "CLOSED" is reached. Thus, after a FIN is confirmed in either direction, if this 2MSL elapses, basically, a communi-cation end can be determined. Even if the state does not change smoothly because of packet loss or the like (for example, even if an ACK packet does not arrive after "CLOS-ING"), a retransmitted packet is forwarded immediately after this 2MSL. Thus, the end of TCP communication can be

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		determined if a new FIN packet is not received within the time corresponding to the 2MSL and a margin (2MSL+a) at long-est.") Uchida at [0104] ("Hereinafter, the description will be made, assuming that a packet forwarding apparatus Cl according to the present invention relays TCP communication between a com-puter (client) Dl 0 and a server D20 that use network configu-rations illustrated in FIG. 7. In the example of FIG. 7, the computer Dl0 belongs to a network represented by 192.168. 0./24 and is set by 192.168.0.10. The server D20 belongs to a network represented by 192.168.1./24 and is set by 192.168. 1.10. As in the case of the OpenFlow controller described in Non-Patent Documents 1 and 2, a control apparatus (control-ler) Dl is connected to the packet forwarding apparatus Cl via a dedicated channel and manages connection between the two networks. In the following description, the control appa-ratus (controller) Dl controls the packet forwarding appara-tus Cl so that connection from other networks appears as communication from network number 1 (192.168.1.1) of the respective networks (see process rule actions in FIG. 19). In addition, in the present specific example, since FIN packets are monitored, the end determination information extraction unit Cl 7 monitors a protocol stack, including: fields in which the TCP is determined; and the FIN flag in the TCP header.") Uchida at [0105] ("FIG. 8 is a flow chart of a flow end determination process using FIN flags. In FIG. 8, steps relating to a timeout determination are added to steps Slll to S116 in the flow chart in FIG. 3. Thus, the flow chart in FIG. 8 includes more detailed steps than the flow chart of FIG. 3. Hereinafter, operations will be described with reference to FIGS. 3, 6, and 8 and FIGS. 9 to 13. In practice, prior to TCP/IP communi-cation, ARP (Address Resolution Protocol) communication is executed, and a process rule may be set in that stage. However, for ease of description, description of the ARP communication will be omitted. The following description will be made based on communication at the TCP/IP level.") Uchida at [0106] ("First, the computer Dl0 starts communication with the server D20. For an initial establishment of communica-tion, a packet (SYN) is inputted to the packet forwarding apparatus Cl (start of ACTIVE OPEN through SYN forward-ing in FIG. 6). The packet reception unit Cl0 receives and stores this first packet in the packet storage unit Cll (steps SlOl to S102 in FIG. 3).")

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		Uchida at [0107] (“The packet reception unit C10 notifies the packet process information extraction unit C12 and the end determination information extraction unit C17 of reception of the packet. The packet process information extraction unit C12 refers to the packet storage unit C11 and extracts information such as IP source and destination information that is necessary to search for a process rule (step S103 in FIG. 3). Hereinafter, a process corresponding to steps S103 to S110 in FIG. 3 will be executed.”) Uchida at [0115] (“Upon receiving a notification that the packet has been received by the packet reception unit Cl 0, the end deter-mination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN flag (step S201 in FIG. 8).”) Uchida at [0116] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 1; the source address is 192.168. 0.10; the destination is 192.168.1.10; and the protocol is TCP (the type is Ox0006)) and stands by until forwarding of the packet. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a process rule to be deleted from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule to be deleted represents that the source address is 192.168.1.1; the destination is 192.168.1.1 0; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”) Uchida at [0117] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0121] (“Next, after an ACK reply in response to the FIN packet from the computer DlO is forwarded from the server D20 in the same way as the above normal

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		packet (start of PASSIVE CLOSE in FIG. 6), the server D20 transmits a FIN packet to the computer DlO. When this FIN packet is inputted to the packet forwarding apparatus Cl, the flow end determi-nation process from steps Slll to S116 is started, as in the case of the above start of ACTIVE CLOSE.”) Uchida at [0122] (“Upon receiving a notification that the packet has been received from the packet reception unit Cl0, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN packet (step S201 in FIG. 8).”) Uchida at [0123] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a modified process rule represents that the source address is 192.168.1. 10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extrac-tion unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”) Uchida at [0124] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203 in FIG. 8). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0125] (“At this point, since a FIN packet has been transmit-ted, the flow end check unit C18 uses the information for identifying a process rule to be deleted as a key, extracts the process rule (process rule corresponding to ingress port 2 in FIG. 11) from the process rule storage unit C13, and marks a FIN packet reception flag (steps S204 to S205 in

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		FIG. 8). This process corresponds to the internal state update process in step S115 in FIG. 3.”) Uchida at [0134] (“Referring back to the state transition diagram of TCP connection in FIG. 6, there are two cases where "CLOSED" at the top of FIG. 6 is reached without a state transition involving FIN flags. One case arises when the ses-sion is closed from SYN_SENT, which is reached when a SYN packet in which a SYN flag is marked is transmitted. The other case arises when a timeout is generated. In such case, while the packet forwarding apparatus cannot monitor the closed session, the packet forwarding apparatus can con-firm a timeout in the following way. In the present specific example, a flow end is determined by this timeout.”) Uchida at [0135] (“n the present specific example, if a SYN/ ACK packet does not flow in a direction opposite to the SYN packet flow direction within a predetermined time (from "SYN_ RCVD" to "SYN_SENT" in FIG. 6), a timeout is determined.”) Uchida at [0136] (“FIG. 14 is a flow chart illustrating a flow end deter-mination process using a SYN flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the dif-ference.”) Uchida at [0137] (“In FIG. 14, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage, unit Cll, monitors a TCP SYN flag, and finds a SYN packet (step S301 in FIG. 14).”) Uchida at [0138] (“Since a SYN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for

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		identifying a process rule repre-sents that the source address is 192.168.1.10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the SYN packet has been received and these items of information (step S302 in FIG. 14).”) Uchida at [0139] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether a SYN flag is set in a prede-termined packet header position and an ACK flag is not marked (step S303 in FIG. 14). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0148] (“ Next, a third specific example in which a flow end determination is executed by using a TCP RST (reset) flag will be described.”) Uchida at [0149] (“Referring back to the state transition diagram of TCP connection in FIG. 6, there is a transition from "SYN_ RCVD," which is a communication establishment standby state, to "LISTEN," which is a communication standby state. A TCP RST (reset) flag signifies release of connection and retry of communication. Namely, since a RST packet in which this RST flag is set signifies invalidation of communi-cation, by detecting this RST flag, a flow end can be deter-mined.”) Uchida at [0150] (“FIG. 16 is a first flow chart illustrating a flow end determination process using a RST flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the difference.”) Uchida at [0151] (“In FIG. 16, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP RST flag, and finds a RST packet (step S401 in FIG. 16).”) Uchida at [0152] (“Since a RST flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168.

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		1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the RST packet has been received and these items of information (step S402 in FIG. 16).") Uchida at [0164] ("For example, in a specific example of the present invention, certain TCP flags are monitored. A single packet forwarding apparatus can monitor these flags in a parallel fashion. For example, after a packet that triggers a flow end is detected, the above process may be allowed to branch to the above FIGS. 8, 14, and 16 (17) to realize parallel monitoring.")

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18[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Swenson discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
18[b]	the header comprises at least the first and second entities addresses in the packet network, and	Swenson discloses the header comprises at least the first and second entities addresses in the packet network. For example, Swenson discloses source and destination addresses included in the packet flow header. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this

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		case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)

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18[c]	wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses.	Swenson discloses wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses. For example, Swenson discloses the one or more signatures, desired criteria, or conditions associated with a packet flow including matching a source and/or destination address. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be

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		based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0075] (“Ideally, a flow can be assigned to the mapped user flows block 726 for a user or subscriber by the user's source IP address. However, in some cases, flows associated with an IP address may often be associated with a group of users or subscribers, but there is not enough information to identify a particular user or subscriber. In these cases, a pseudo sub-scriber id can be assigned in the default user flows block 724 until real users or subscribers are identified as more flows are observed.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)

No.	’111 Patent Claim 19	Swenson
19	The method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses.	Swenson discloses the method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses. For example, Swenson discloses IP addresses used to identify network flows. *See supra* at Claim 18. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering

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		device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0027] (“However, information on the wireless/cellular user devices 110 side is often not available at the steering device 130 that sits between the cellular network and the wired Internet. For example, there is often no information about the identifiers of the towers associated with the mobile devices 110. Tower association information only broadcasted when the mobile devices first attached to the network. In addition, user devices 110 do not usually report any identification information except their IP addresses. Therefore, monitoring of the network traffic and detection of the congestion is auto-mated and managed by the detector 140 so that network can be optimized for end user's experience without the mobile user's knowledge.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0047] (“ The subscriber log 324 stores user or subscriber information, such as user or subscriber identifications and their device information. In one embodiment, the subscriber and device information is provided to the subscriber log 324 by the administrators or operators of the carrier or service provider networks. In other embodiments, the subscriber or the device information of the carrier networks (e.g., mobile ISPs) is not available to the network controller 140. This makes bandwidth measurement

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		more difficult since multiple users' devices may share a single IP address using the net-work address translation (NAT) protocol. Accordingly, algo-rithms that separate multiple users sharing an IP address can be implemented by the flow analyzer 312 to determine the amount of bandwidth available to individual users.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0062] (“Based on the flow statistics stored in the flow cache 322, the network controller 140 can also aggregate the flows associated with a user or subscriber in order to estimate the total available bandwidth occupied by the user or subscriber. In one embodiment, the network controller 140 tracks all the flow cache entries looking for flows originated from a com-mon source IP address or a user device identifier. The flow analyzer 312 of the network controller 140 then attempts to group these flows together to form a flow history for the user or subscriber. The network controller further identifies users or subscribers using two data components in the flow cache entry: the TCP source port and HTTP cookies associated with the flow. Together with the flow history, the network control-ler 140 establish pattern, and identify users or subscribers and stores subscriber information in the subscriber log 324. More details of the flow cache and user mapping are described below with reference to FIG. 7.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of intern al components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in

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		the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0074] (“A flow cache block 720 pointed to by the flow cache entry 712 is shown to include information on source IP 722, one or more user flow blocks, which represent a logical group of flows associated with a user, a subscriber, or an entity representing a potential subscriber. Examples of these user flow blocks are default user flows block 724 and mapped user flows block 726. The default user flows block 724 store flows that are not yet associated with any particular user or sub-scriber. If the subscriber id or any other identifiers associated with a particular user is known a-priori, all the flows associ-ated with the particular user or subscriber will be assigned to the mapped user flows block 726. The mapped user flows block 726 also include flows that either have been, or are in the process of being mapped to a user or subscriber by the flow analyzer 312. The mapped user flows block 726 can be indexed using subscriber id.”) Swenson at [0075] (“Ideally, a flow can be assigned to the mapped user flows block 726 for a user or subscriber by the user's source IP address. However, in some cases, flows associated with an IP address may often be associated with a group of users or subscribers, but there is not enough information to identify a particular user or subscriber. In these cases, a pseudo sub-scriber id can be assigned in the default user flows block 724 until real users or subscribers are identified as more flows are observed.”) Swenson at [0076] (“An example user flow block 730 that can be included in the default user flows block 724 and the mapped user flows block 726 contains data fields like the subscriber id 732 (pseudo or real) estimated bandwidth 734, a list of all flows 736 associated with the subscriber id 732, and a list of cookie hashes 738 among other related flow information. Each entry in the list of cookie hashes 738 contains one unique cookie seen within the flows. The list of flows 736 includes one or more flow statistics block 740. Each flow statistics block 740 contains the IP flow identifier 742 (e.g., srcIP, dstIP, srcPort, dstPort), current domain and cookie 7 44, total number of bytes seen in each direction 746, the total number of bytes in each direction as of the last update 748. Not shown in the FIG. 7 includes a list of cookie hashes associated with the flow and an expiration time”)

No.	’111 Patent Claim 19	Swenson
		Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)

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20[a]	The method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields, and	Swenson discloses the method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields. For example, Swenson discloses TCP packet flows with TCP port identifier information. *See supra* at Claim 1, 17[a]. Swenson at [0019] (“In one embodiment, an on-demand network moni-toring method is adopted to gather data about network flows as they traverse the network. For example, network flows can be monitored selectively or on-demand based on the types of the content carried in the flows. Furthermore, the network monitoring can also be performed selectively at inline level, as well as out-of-band to improve efficiency. Both TCP and UDP flows are monitored to gather information about the state of the network, such as the average network throughput for each flow and end-to-end latency between, for example, a client device and an origin server providing multimedia con-tent to the client device. For each TCP or UDP flow, the system tracks the number of bytes sent (and in some embodi-ments acknowledged). In TCP, the current window size may also be tracked. Records on network flows are stored in a flow statistics database, which can be indexed by subscriber iden-tification (ID), cell tower (base station), and network segment etc. As many flow

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		records accumulate, this database repre-sents both historical and current network condition and capacity for delivering data. Network throughput can be mea-sured by calculating an average number of bytes delivered over a period of time. Steps may be taken to filter out spurious data from small flows with size less than a certain threshold that, when measured, cause very noisy results in measuring bandwidth and/or latency. For example, any flow having delivery time of less than 500 ms can be filtered.”) Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic

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		data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0044] ("Additionally, historical flow data over a longer term helps the flow analyzer 312 to determine repeating patterns and heat-maps of certain network sections and to predict when they are under congestion. In this case, the flow statis-tics stored in the flow cache 322 can be mapped against traffic categories for analysis, for example, long-term running aver-ages of video flow bandwidth help determine suitability for optimization. Furthermore, estimated bandwidth per user (or per cell-ID, per tower, or per router) over time may be metrics calculated by the flow analyzer 312 in order to determine short term needs for optimization. For example, the flow analyzer 312 may determine to being optimizing flows asso-ciated with a particular cell-ID (or those flows for identified high-bandwidth users on the cell-ID) in response to a thresh-old number of high-bandwidth users connecting to a same cell tower corresponding to the cell-ID. The reason why flow analyzer 312 selectively monitors large flows lies in the real-ization that TCP statistics for small objects, which make up most web flows, can be misleading and cause huge errors in throughput estimations.") Swenson at [0061] ("Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the

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		network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0062] (“ Based on the flow statistics stored in the flow cache 322, the network controller 140 can also aggregate the flows associated with a user or subscriber in order to estimate the total available bandwidth occupied by the user or subscriber. In one embodiment, the network controller 140 tracks all the flow cache entries looking for flows originated from a com-mon source IP address or a user device identifier. The flow analyzer 312 of the network controller 140 then attempts to group these flows together to form a flow history for the user or subscriber. The network controller further identifies users or subscribers using two data components in the flow cache entry: the TCP source port and HTTP cookies associated with the flow. Together with the flow history, the network control-ler 140 establish pattern, and identify users or subscribers and stores subscriber information in the subscriber log 324. More details of the flow cache and user mapping are described below with reference to FIG. 7.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0084] (“The flow analyzer 312 can also map flows to users (subscribers to the mobile or network service) in the flow cache entries by matching cookie hashes, MAC address (or any unique device identifiers), or TCP source ports. For example, if two flows share the same source port, it is very likely that they belong to the same user because TCP ports are reused often by an individual user, but not often between users. Furthermore, source ports can also be used to map users when network address translation (NAT) is deployed. In a typical network with NAT configuration, each user is allo-cated a block (e.g., 32) of TCP source ports. A random port number within the block is then picked for each

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		new user flows initiated. With this knowledge, all source ports within a block can be aggregated under the same user. In some cases, a user with more than one block of port number assigned, the cookie hashes can be used to link the blocks together.")
20[b]	wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values.	Swenson discloses wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values. For example, Swenson discloses TCP packet flows with TCP port identifier information that can be used as one of more signatures, desired criteria, or conditions of the packet flow to determine if the flow matches. Swenson at [0019] ("In one embodiment, an on-demand network moni-toring method is adopted to gather data about network flows as they traverse the network. For example, network flows can be monitored selectively or on-demand based on the types of the content carried in the flows. Furthermore, the network monitoring can also be performed selectively at inline level, as well as out-of-band to improve efficiency. Both TCP and UDP flows are monitored to gather information about the state of the network, such as the average network throughput for each flow and end-to-end latency between, for example, a client device and an origin server providing multimedia con-tent to the client device. For each TCP or UDP flow, the system tracks the number of bytes sent (and in some embodi-ments acknowledged). In TCP, the current window size may also be tracked. Records on network flows are stored in a flow statistics database, which can be indexed by subscriber iden-tification (ID), cell tower (base station), and network segment etc. As many flow records accumulate, this database repre-sents both historical and current network condition and capacity for delivering data. Network throughput can be mea-sured by calculating an average number of bytes delivered over a period of time. Steps may be taken to filter out spurious data from small flows with size less than a certain threshold that, when measured, cause very noisy results in measuring bandwidth and/or latency. For example, any flow having delivery time of less than 500 ms can be filtered.")

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		Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0044] (“Additionally, historical flow data over a longer term helps the flow analyzer 312 to determine repeating patterns and heat-maps of certain network sections and to predict when they are under congestion. In this case, the flow statis-tics stored in the flow cache 322 can be mapped against traffic categories for analysis, for example, long-term

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		running aver-ages of video flow bandwidth help determine suitability for optimization. Furthermore, estimated bandwidth per user (or per cell-ID, per tower, or per router) over time may be metrics calculated by the flow analyzer 312 in order to determine short term needs for optimization. For example, the flow analyzer 312 may determine to being optimizing flows asso-ciated with a particular cell-ID (or those flows for identified high-bandwidth users on the cell-ID) in response to a thresh-old number of high-bandwidth users connecting to a same cell tower corresponding to the cell-ID. The reason why flow analyzer 312 selectively monitors large flows lies in the real-ization that TCP statistics for small objects, which make up most web flows, can be misleading and cause huge errors in throughput estimations.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0062] (“ Based on the flow statistics stored in the flow cache 322, the network controller 140 can also aggregate the flows associated with a user or subscriber in order to

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		estimate the total available bandwidth occupied by the user or subscriber. In one embodiment, the network controller 140 tracks all the flow cache entries looking for flows originated from a com-mon source IP address or a user device identifier. The flow analyzer 312 of the network controller 140 then attempts to group these flows together to form a flow history for the user or subscriber. The network controller further identifies users or subscribers using two data components in the flow cache entry: the TCP source port and HTTP cookies associated with the flow. Together with the flow history, the network control-ler 140 establish pattern, and identify users or subscribers and stores subscriber information in the subscriber log 324. More details of the flow cache and user mapping are described below with reference to FIG. 7.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0084] (“The flow analyzer 312 can also map flows to users (subscribers to the mobile or network service) in the flow cache entries by matching cookie hashes, MAC address (or any unique device identifiers), or TCP source ports. For example, if two flows share the same source port, it is very likely that they belong to the same user because TCP ports are reused often by an individual user, but not often between users. Furthermore, source ports can also be used to map users when network address translation (NAT) is deployed. In a typical network with NAT configuration, each user is allo-cated a block (e.g., 32) of TCP source ports. A random port number within the block is then picked for each new user flows initiated. With this knowledge, all source ports within a block can be aggregated under the same user. In some cases, a user with more than one block of port number assigned, the cookie hashes can be used to link the blocks together.”)

No.	'111 Patent Claim 21	Swenson
21	The method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network.	Swenson discloses the method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network. For example, Swenson discloses a service provider network comprised of an Internet service provider. *See supra* at Claim 1. Swenson at Abstract ("A system and a method are disclosed for selectively monitor-ing traffic in a service provider network. The system receives a notice for a beginning of a network data flow, which responds to a request from a user device for content at an origin server. The system then determines whether to monitor the data flow from the origin server to the user device. If so determined, the system collects statistic information of the data flow and stores the statistic information to a flow record in a database. The system also maps the flow record to a subscriber of the service provider network by analyzing the statistic information of the data flow and estimates bandwidth provided to the data flow by the service provider's network based on the analysis of the statistic information of the data flow.") Swenson at [0005] ("Mobile devices, such as smart phones and tablets, have become prevalent in recent years. Given the fast advance in mobile computing power and far-reaching wireless Inter-net access, more and more users view streamed videos on their mobile devices. The detection of network congestion has become increasingly important for network operators attempting to maximize user experience on the network. Even as network operators are ever increasing the capacity of their networks, the demand for bandwidth is growing at an even faster pace. Managing network growth and dealing with con-gestion in the infrastructure is particularly important in the mobile space because of the high cost of radio spectrum and radio access network (RAN) equipment utilized by wireless mobile networks. These high costs prevent mobile service providers from engineering excess capacity into each net-work access point through the purchase of additional RAN infrastructure. The same situation can, however, also happens to other types of network infrastructure.")

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		Swenson at [0006] ("Existing network elements can give operators a view into the current state of traffic in their network, but they do not provide a measure of "goodness," i.e., how much elasticity is left or how much more data can the network handle. This measure is important for multimedia content delivery since a good user experience usually depends on the network's ability to deliver data in a reliable and sustainable fashion. A minimum data rate is required to prevent stalling and re-buffering during the streaming of multimedia content, hence ensuring sufficient bandwidth is important to quality of experience. Typically, multimedia content providers are suf-ficiently equipped to deliver multimedia content at levels far beyond the capabilities of wireless infrastructure. Hence, the burden falls on wireless service providers to implement net-work data optimization to ease the traffic burden and maxi-mize the experience of each and every user on the network. Currently, however, mobile service providers are often forced to use very coarse tools that have little visibility into which network segments are congested and tend to apply optimiza-tion to flows that may not need any optimization.") Swenson at [0007] ("Typically, mobile service providers use inline net-work appliances that monitor every bit of subscriber traffic in order to make estimates of network throughput. This puts a huge burden on the system since it must scale to handle hundreds of thousands to millions of network requests per second through a single network access point. Furthermore, network service providers often must utilize these monitoring techniques on a micro-scale (e.g., per RAN equipment instal-lation) in order to react to the condition of the network, which results in increased cost. In addition, a large portion of web traffic consists of small object requests, which can obscure network monitoring at any level due to their short lifetime and bursty characteristics.") Swenson at [0024] ("A network efficiency strategy that aspires to keep capital expenditure from outpacing revenues has to be bal-anced with demands from consumers for better user experi-ences that rely increasingly on higher data usage. Today, mobile operators are employing a variety of tools to manage capacity including data usage caps, Wi-Fi offload and intel-ligent optimization. The environment 100 demonstrates such a solution that provides a unified foundation with deep ses-sion intelligence, integrated services management, and dynamic adaptability to fit any service offering. Together, the network controller 140 and the video optimizer 150 deliver a world-class media optimization

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		solution that brings a surgical capacity advantage to wireless operators as well as Internet service providers with better peak capacity savings than alter-native solutions.”) Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0047] (“The subscriber log 324 stores user or subscriber information, such as user or subscriber identifications and their device information. In one embodiment, the subscriber and device information is provided to the subscriber log 324 by the administrators or operators of the carrier or service provider networks. In other embodiments, the subscriber or the device information of the carrier networks (e.g., mobile ISPs) is not available to the network controller 140. This makes bandwidth measurement more difficult since multiple users' devices may share a single IP address using the net-work address translation (NAT) protocol. Accordingly, algo-rithms that separate multiple users sharing an IP address can be implemented by the flow analyzer 312 to determine the amount of bandwidth available to individual users.”)

No.	’111 Patent Claim 22	Swenson
22	The method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client	Swenson discloses the method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device. For example, Swenson discloses a user device and an origin server. *See supra* at Claim 1.

No.	’111 Patent Claim 22	Swenson
	device and the second entity is a server device..	Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0030] (“The video optimizer 150 is a computer server that provides video and image optimization and delivers opti-mized video and image content to the user devices 110 via the network 120. The video and image optimization is an on-demand service provided through the transcoding of the video and image content. For example, when a user device attempts to retrieve video from the origin server 160, the network controller 140 may decide that the flow meets certain criteria for content optimization. The network controller 140 then redirected the user devices 110 to the video optimizer 150 to retrieve the optimized content. The video optimizer 150 receives information in the redirect request from the user devices 110 or from the network controller 140 about the video or image content to be optimized and retrieve the video or image content from the corresponding origin server 160 for optimization and subsequent delivery to the user devices 110.”) Swenson at [0032] (“The video optimizer 150 and the origin server 160 are typically formed of one or more computers. While only one server of each video optimizer 150 and origin server 160 is shown in the environment 100 of FIG. 1, different embodi-ments may include multiple web servers and video servers operated by a single entity or multiple entities. In other embodiments, a single server may also provide different func-tionalities, such as delivering web content as a web server, as well as serving optimized video content.”) Swenson at [0034] (“The machine may be a server computer, a client computer, a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a cellular tele-phone, a smart phone, a web appliance, a network router, switch or bridge, or

No.	’111 Patent Claim 22	Swenson
		any machine capable of executing instructions 224 (sequential or otherwise) that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute instructions 224 to perform any one or more of the methodologies discussed herein.”) Swenson at [0055] (“The video optimizer redirector 318 generates a redi-rect request to a URL pointing to the video optimizer 150 if the video is deemed to be transcoded. In one embodiment, the URL may contain at least one of a video resolution, a video bit rate, a video frame rate divisor, an audio sample rate and number of channels, an audio bit rate, a source URL, a user agent of a client, a source domain cookie and any other authentication data by the video optimizer 150. The video optimizer redirector 318 rewrites the original response with the HTTP redirect and sets the location header to the new URL. This causes the user devices 110 to issue a new request to the video optimizer 150. The video optimizer redirector 318 also has the logic to look for incoming URLs generated by itself so that they are not intercepted again.”) Swenson at [0058] (“Referring now to FIG. 4A, network traffic flows from the user device 110 through the steering device 130 and arrive at the origin server 160 over the network request path. For example, a browser on the user device 110 may request web content from the origin server 160. A HTTP request message initiated at the user device 110 is forwarded to the steering device 130 over the network link 411. A data switch 402 inside the steering device 130 then relays the request message to the origin server 160 over the network link 412. On the opposite direction, network traffic originated from the origin server 160 flows through the steering device 130 back to the user device 110 over the network response path. For example, the origin server 160 responds to the user request by sending web content over the network link 413 to the steering device 130, which forwards the web content to the user device 110 over the network link 416. Note that the network links 411 and 416 are two opposite directions on the same physical link, so are the network link pair 414 and 415. On the other hand, the network link pair 412 and 413 may or may not share the same network path because traffic between the steering device 130 and origin server 160 on opposite directions may be routed differently over one or more routers.”)

No.	’111 Patent Claim 22	Swenson
		Swenson at [0070] (“Once the user device 110 receives the HTTP redirect request 620, the user device 110 sends the request over the network to the video optimizer 150. In one embodiment, the network controller 140 monitors the traffic and/or requests from the client device 110 as the HTTP redirect request 620 is routed to the video optimizer 150. In such a configuration, the video optimizer 150 only sees requests for video files that need to be transcoded (i.e., optimized) and are associated with a HTTP redirect request 620. As such, the video optimizer 150 is not burdened with all the requests generated by a user device 110.”) Swenson at [0095] (“Certain embodiments are described herein as including logic or a number of components, modules, or mechanisms. Modules may constitute either software mod-ules (e.g., code embodied on a machine-readable medium or in a transmission signal) or hardware modules. A hardware module is tangible unit capable of performing certain opera-tions and may be configured or arranged in a certain manner. In example embodiments, one or more computer systems (e.g., a standalone, client or server computer system) or one or more hardware modules of a computer system (e.g., a pro-cessor or a group of processors 102) may be configured by software (e.g., an application or application portion) as a hardware module that operates to perform certain operations as described herein.”)

No.	’111 Patent Claim 23	Swenson
23[a]	The method according to claim 22, wherein the server device comprises a web server, and	Swenson discloses the method according to claim 22, wherein the server device comprises a web server. For example, Swenson discloses servers that’s provide different functionalities, such as delivering web content as a web server. *See supra* at Claim 22. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further

No.	’111 Patent Claim 23	Swenson
		inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0030] (“The video optimizer 150 is a computer server that provides video and image optimization and delivers opti-mized video and image content to the user devices 110 via the network 120. The video and image optimization is an on-demand service provided through the transcoding of the video and image content. For example, when a user device attempts to retrieve video from the origin server 160, the network controller 140 may decide that the flow meets certain criteria for content optimization. The network controller 140 then redirected the user devices 110 to the video optimizer 150 to retrieve the optimized content. The video optimizer 150 receives information in the redirect request from the user devices 110 or from the network controller 140 about the video or image content to be optimized and retrieve the video or image content from the corresponding origin server 160 for optimization and subsequent delivery to the user devices 110.”) Swenson at [0032] (“The video optimizer 150 and the origin server 160 are typically formed of one or more computers. While only one server of each video optimizer 150 and origin server 160 is shown in the environment 100 of FIG. 1, different embodi-ments may include multiple web servers and video servers operated by a single entity or multiple entities. In other embodiments, a single server may also provide different func-tionalities, such as delivering web content as a web server, as well as serving optimized video content.”) Swenson at [0034] (“The machine may be a server computer, a client computer, a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a cellular tele-phone, a smart phone, a web appliance, a network router, switch or bridge, or any machine capable of executing instructions 224 (sequential or otherwise) that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute instructions 224 to perform any one or more of the methodologies discussed herein.”)

No.	’111 Patent Claim 23	Swenson
		Swenson at [0058] (“Referring now to FIG. 4A, network traffic flows from the user device 110 through the steering device 130 and arrive at the origin server 160 over the network request path. For example, a browser on the user device 110 may request web content from the origin server 160. A HTTP request message initiated at the user device 110 is forwarded to the steering device 130 over the network link 411. A data switch 402 inside the steering device 130 then relays the request message to the origin server 160 over the network link 412. On the opposite direction, network traffic originated from the origin server 160 flows through the steering device 130 back to the user device 110 over the network response path. For example, the origin server 160 responds to the user request by sending web content over the network link 413 to the steering device 130, which forwards the web content to the user device 110 over the network link 416. Note that the network links 411 and 416 are two opposite directions on the same physical link, so are the network link pair 414 and 415. On the other hand, the network link pair 412 and 413 may or may not share the same network path because traffic between the steering device 130 and origin server 160 on opposite directions may be routed differently over one or more routers.”)
23[b]	wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device.	Swenson discloses wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device. For example, Swenson discloses a user device that may be a client computer, a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a cellular tele-phone, a smart phone, a web appliance, etc. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”)

No.	’111 Patent Claim 23	Swenson
		Swenson at [0034] (“The machine may be a server computer, a client computer, a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a cellular tele-phone, a smart phone, a web appliance, a network router, switch or bridge, or any machine capable of executing instructions 224 (sequential or otherwise) that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute instructions 224 to perform any one or more of the methodologies discussed herein.”) Swenson at [0058] (“Referring now to FIG. 4A, network traffic flows from the user device 110 through the steering device 130 and arrive at the origin server 160 over the network request path. For example, a browser on the user device 110 may request web content from the origin server 160. A HTTP request message initiated at the user device 110 is forwarded to the steering device 130 over the network link 411. A data switch 402 inside the steering device 130 then relays the request message to the origin server 160 over the network link 412. On the opposite direction, network traffic originated from the origin server 160 flows through the steering device 130 back to the user device 110 over the network response path. For example, the origin server 160 responds to the user request by sending web content over the network link 413 to the steering device 130, which forwards the web content to the user device 110 over the network link 416. Note that the network links 411 and 416 are two opposite directions on the same physical link, so are the network link pair 414 and 415. On the other hand, the network link pair 412 and 413 may or may not share the same network path because traffic between the steering device 130 and origin server 160 on opposite directions may be routed differently over one or more routers.”)

No.	’111 Patent Claim 24	Swenson
24	The method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol.	Swenson discloses the method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol. For example, Swenson discloses communication between the network controller and steering device using the Internet content adaption protocol (ICAP). Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Swenson is found to not meet this limitation, wherein the communication between the network node and the controller is based on, or uses, a standard

No.	'111 Patent Claim 24	Swenson
		protocol would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 22. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0056] ("FIGS. 4A and 4B each illustrates one embodiment of an example working mode of the network controller for providing selective on-demand real-time network monitoring and subscriber identification. Shown with the network con-troller 140 are the user device 110, the steering device 130, and the origin server 160. The network controller 140 is coupled to the steering device 130 through the steering device interface 316. In one embodiment, the network controller 140 and the steering device 130 communicate with each other using the Internet content adaption protocol (ICAP). The steering device interface 316 executes an ICAP server 406, which interacts with an ICAP client 404 running on the steer-ing device 130. Similar or different protocols may be used for communication between the network controller 140 and the steering device 130 in other embodiments.") Swenson at [0057] ("The Internet content adaption protocol is a light-weight protocol aimed at executing a simple remote proce-dure call on HTTP messages. ICAP leverages edge-based devices to help deliver value-added services using transparent HTTP proxy caches. Content adaptation refers to performing the particular value added service, such as content manipula-tion or other processing, for the associated HTTP client request/response. ICAP clients pass HTTP messages to ICAP servers for transformation or other processing. In turn,

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		the ICAP server executes its transformation service on the HTTP messages and sends back responses to the ICAP client. At the core of this process is a cache that can proxy all client trans-actions and process them through ICAP servers, which may focus on specific functions, such as ad insertion, virus scan-ning, content translation, language translation, or content fil-tering. ICAP servers, such as those utilized by the network controller 140, handle these tasks to off-load value-added services from network devices including an ICAP client, such as the steering device 130. By offloading value added services from the steering device 130, processing infrastructure (e.g., optimization services and network controllers) may be scaled independent from the steering devices handling raw HTTP throughput.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Swenson in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 24 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses a packet network using the OpenFlow protocol, which is used in Software Defined Networks for communication between network device and a controller. Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.”) Kempf at [0006] (“A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control

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		plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).") Kempf at [0007] ("A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor

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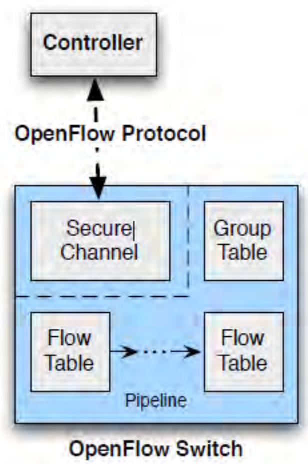
		resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”) Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a

No.	’111 Patent Claim 24	Swenson
		web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) As another example, OpenFlow is a standard protocol used in SDNs to communicate between an OpenFlow switch and controller. OpenFlow at 6-7  Figure 1: Main components of an OpenFlow switch.

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		2 Switch Components An OpenFlow Switch consists of one or more *flow tables* and a *group table*, which perform packet lookups and forwarding, and an *OpenFlow channel* to an external controller (Figure 1). The switch communicates with the controller and the controller manages the switch via the OpenFlow protocol. Using the OpenFlow protocol, the controller can add, update, and delete *flow entries* in flow tables, both reactively (in response to packets) and proactively. Each flow table in the switch contains a set of flow entries; each flow entry consists of *match fields*, *counters*, and a set of *instructions* to apply to matching packets (see 5.2). Matching starts at the first flow table and may continue to additional flow tables (see 5.1). Flow entries match packets in priority order, with the first matching entry in each table being used (see 5.3). If a matching entry is found, the instructions associated with the specific flow entry are executed. If no match is found in a flow table, the outcome depends on configuration of the table-miss flow entry: for example, the packet may be forwarded to the controller over the OpenFlow channel, dropped, or may continue to the next flow table (see 5.4). Instructions associated with each flow entry either contain actions or modify pipeline processing (see 5.9). Actions included in instructions describe packet forwarding, packet modification and group table

No.	'111 Patent Claim 24	Swenson
		processing. Pipeline processing instructions allow packets to be sent to subsequent tables for further processing and allow information, in the form of metadata, to be communicated between tables. Table pipeline processing stops when the instruction set associated with a matching flow entry does not specify a next table; at this point the packet is usually modified and forwarded (see 5.10). Flow entries may forward to a *port*. This is usually a physical port, but it may also be a logical port defined by the switch or a reserved port defined by this specification (see 4.1). Reserved ports may specify generic forwarding actions such as sending to the controller, flooding, or forwarding using non-OpenFlow methods, such as "normal" switch processing (see 4.5), while switch-defined logical ports may specify link aggregation groups, tunnels or loopback interfaces (see 4.4). Actions associated with flow entries may also direct packets to a group, which specifies additional processing (see 5.6). Groups represent sets of actions for flooding, as well as more complex forwarding semantics (e.g. multipath, fast reroute, and link aggregation). As a general layer of indirection, groups also enable multiple flow entries to forward to a single identifier (e.g. IP forwarding to a common next hop). This abstraction allows common output actions across flow entries to be changed efficiently. The group table contains group entries; each group entry contains a list of *action buckets* with specific semantics dependent on group type (see 5.6.1). The actions in one or more action buckets are applied to packets sent to the group. Switch designers are free to implement the internals in any way convenient, provided that correct match and instruction semantics are preserved. For example, while a flow entry may use an all group to forward to multiple ports, a switch designer may choose to implement this as a single bitmask within the hardware forwarding table. Another example is matching; the pipeline exposed by an OpenFlow switch may be physically implemented with a different number of hardware tables.

No.	'111 Patent Claim 27	Swenson
27	The method according to claim 1, wherein the network node comprises a router, a switch, or a bridge.	Swenson discloses the method according to claim 1, wherein the network node comprises a router, a switch, or a bridge. For example, Swenson discloses a steering device that may be a router. *See supra* at Claim 1. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering

No.	’111 Patent Claim 27	Swenson
		device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”)

No.	’111 Patent Claim 28	Swenson
28	The method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet.	Swenson discloses the method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet. For example, Swenson discloses packet flows in a network with IP addresses. *See supra* at Claim 1. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140

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		interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0027] ("However, information on the wireless/cellular user devices 110 side is often not available at the steering device 130 that sits between the cellular network and the wired Internet. For example, there is often no information about the identifiers of the towers associated with the mobile devices 110. Tower association information only broadcasted when the mobile devices first attached to the network. In addition, user devices 110 do not usually report any identification information except their IP addresses. Therefore, monitoring of the network traffic and detection of the congestion is auto-mated and managed by the detector 140 so that network can be optimized for end user's experience without the mobile user's knowledge.") Swenson at [0040] ("The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.") Swenson at [0047] (" The subscriber log 324 stores user or subscriber information, such as user or subscriber identifications and their device information. In one embodiment, the subscriber and device information is provided to the subscriber log 324 by the administrators or operators of the carrier or service provider networks. In other embodiments, the subscriber or the device information of the carrier networks (e.g., mobile ISPs) is not available to the network controller 140. This makes bandwidth measurement more difficult since multiple users' devices may share a single IP address using the net-work address translation (NAT) protocol. Accordingly, algo-rithms that separate multiple users

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		sharing an IP address can be implemented by the flow analyzer 312 to determine the amount of bandwidth available to individual users.") Swenson at [0059] ("In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0062] ("Based on the flow statistics stored in the flow cache 322, the network controller 140 can also aggregate the flows associated with a user or subscriber in order to estimate the total available bandwidth occupied by the user or subscriber. In one embodiment, the network controller 140 tracks all the flow cache entries looking for flows originated from a com-mon source IP address or a user device identifier. The flow analyzer 312 of the network controller 140 then attempts to group these flows together to form a flow history for the user or subscriber. The network controller further identifies users or subscribers using two data components in the flow cache entry: the TCP source port and HTTP cookies associated with the flow. Together with the flow history, the network control-ler 140 establish pattern, and identify users or subscribers and stores subscriber information in the subscriber log 324. More details of the flow cache and user mapping are described below with reference to FIG. 7.") Swenson at [0073] ("FIG. 7 is a block diagram illustrating one embodi-ment of an example of intern al components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be

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		based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.") Swenson at [0074] ("A flow cache block 720 pointed to by the flow cache entry 712 is shown to include information on source IP 722, one or more user flow blocks, which represent a logical group of flows associated with a user, a subscriber, or an entity representing a potential subscriber. Examples of these user flow blocks are default user flows block 724 and mapped user flows block 726. The default user flows block 724 store flows that are not yet associated with any particular user or sub-scriber. If the subscriber id or any other identifiers associated with a particular user is known a-priori, all the flows associ-ated with the particular user or subscriber will be assigned to the mapped user flows block 726. The mapped user flows block 726 also include flows that either have been, or are in the process of being mapped to a user or subscriber by the flow analyzer 312. The mapped user flows block 726 can be indexed using subscriber id.") Swenson at [0075] ("Ideally, a flow can be assigned to the mapped user flows block 726 for a user or subscriber by the user's source IP address. However, in some cases, flows associated with an IP address may often be associated with a group of users or subscribers, but there is not enough information to identify a particular user or subscriber. In these cases, a pseudo sub-scriber id can be assigned in the default user flows block 724 until real users or subscribers are identified as more flows are observed.") Swenson at [0076] ("An example user flow block 730 that can be included in the default user flows block 724 and the mapped user flows block 726 contains data fields like the subscriber id 732 (pseudo or real) estimated bandwidth 734, a list of all flows 736 associated with the subscriber id 732, and a list of cookie hashes 738 among other related flow information. Each entry in the list of cookie hashes 738 contains one unique cookie seen within the flows. The list of flows 736 includes one or more flow statistics block 740. Each flow statistics block 740 contains the IP flow identifier 742 (e.g., srcIP, dstIP, srcPort, dstPort), current domain and cookie 7 44, total number of bytes seen in each direction 746, the total number of bytes in each direction as of the last update 748. Not shown in the FIG. 7 includes a list of cookie hashes associated with the flow and an expiration time")

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		Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)

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29	The method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet.	Swenson discloses the method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet. For example, Swenson discloses TCP traffic flows of TCP packets. *See supra* at Claim 28. Swenson at [0019] (“In one embodiment, an on-demand network moni-toring method is adopted to gather data about network flows as they traverse the network. For example, network flows can be monitored selectively or on-demand based on the types of the content carried in the flows. Furthermore, the network monitoring can also be performed selectively at inline level, as well as out-of-band to improve efficiency. Both TCP and UDP flows are monitored to gather information about the state of the network, such as the average network throughput for each flow and end-to-end latency between, for example, a client device and an origin server providing multimedia con-tent to the client device. For each TCP or UDP flow, the system tracks the number of bytes sent (and in some embodi-ments acknowledged). In TCP, the current window size may also be tracked. Records on network flows are stored in a flow statistics database, which can be indexed by subscriber iden-tification (ID), cell tower (base station), and network segment etc. As many flow records accumulate, this database repre-sents both historical and current network condition and capacity for delivering data. Network throughput can be mea-sured by calculating an average number of bytes delivered over a period of time. Steps may be taken to filter out

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		spurious data from small flows with size less than a certain threshold that, when measured, cause very noisy results in measuring bandwidth and/or latency. For example, any flow having delivery time of less than 500 ms can be filtered.”) Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”)

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		Swenson at [0044] (“Additionally, historical flow data over a longer term helps the flow analyzer 312 to determine repeating patterns and heat-maps of certain network sections and to predict when they are under congestion. In this case, the flow statis-tics stored in the flow cache 322 can be mapped against traffic categories for analysis, for example, long-term running aver-ages of video flow bandwidth help determine suitability for optimization. Furthermore, estimated bandwidth per user (or per cell-ID, per tower, or per router) over time may be metrics calculated by the flow analyzer 312 in order to determine short term needs for optimization. For example, the flow analyzer 312 may determine to being optimizing flows asso-ciated with a particular cell-ID (or those flows for identified high-bandwidth users on the cell-ID) in response to a thresh-old number of high-bandwidth users connecting to a same cell tower corresponding to the cell-ID. The reason why flow analyzer 312 selectively monitors large flows lies in the real-ization that TCP statistics for small objects, which make up most web flows, can be misleading and cause huge errors in throughput estimations.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and

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		returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0062] (“ Based on the flow statistics stored in the flow cache 322, the network controller 140 can also aggregate the flows associated with a user or subscriber in order to estimate the total available bandwidth occupied by the user or subscriber. In one embodiment, the network controller 140 tracks all the flow cache entries looking for flows originated from a com-mon source IP address or a user device identifier. The flow analyzer 312 of the network controller 140 then attempts to group these flows together to form a flow history for the user or subscriber. The network controller further identifies users or subscribers using two data components in the flow cache entry: the TCP source port and HTTP cookies associated with the flow. Together with the flow history, the network control-ler 140 establish pattern, and identify users or subscribers and stores subscriber information in the subscriber log 324. More details of the flow cache and user mapping are described below with reference to FIG. 7.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0084] (“The flow analyzer 312 can also map flows to users (subscribers to the mobile or network service) in the flow cache entries by matching cookie hashes, MAC address (or any unique device identifiers), or TCP source ports. For example, if two flows share the same source port, it is very likely that they belong to the same user because TCP ports are reused often by an individual user, but not often between users. Furthermore, source ports can also be used to map users when network address translation (NAT) is deployed. In a typical network with NAT configuration, each user is allo-cated a block (e.g., 32) of TCP source ports. A random port number within the block is then picked for each new user flows initiated. With this knowledge, all source ports within a block can be

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		aggregated under the same user. In some cases, a user with more than one block of port number assigned, the cookie hashes can be used to link the blocks together.”)

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30[a]	The method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets;	Swenson discloses the method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets. For example, Swenson discloses sending by a user device or origin server multiple packets in a flow as well as packet flow requests and responses. *See supra at* Claim 1, 1[c]. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0030] (“The video optimizer 150 is a computer server that provides video and image optimization and delivers opti-mized video and image content to the user devices 110 via the network 120. The video and image optimization is an on-demand service provided through the transcoding of the video and image content. For example, when a user device attempts to retrieve video from the origin server 160, the network controller 140 may decide that the flow meets certain criteria for content optimization. The network controller 140 then redirected the user devices 110 to the video optimizer 150 to retrieve the optimized content.

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		The video optimizer 150 receives information in the redirect request from the user devices 110 or from the network controller 140 about the video or image content to be optimized and retrieve the video or image content from the corresponding origin server 160 for optimization and subsequent delivery to the user devices 110.”) Swenson at [0063] (“FIG. 4B illustrates one embodiment of a second example working mode of the network controller 140 for providing selective on-demand network monitoring. In FIG. 4B, the network request path consists of a network link 421 from the user device 110 to the steering device 130, and a network link 422 from the steering device 130 to the origin server 160. On the opposite direction, the network response path consists of a network link 423 from the origin server 160 to the steering device 130, and a network link 424 from the steering device 13 0 back to the user device 110. Note that the network link pair 421 and 424 share the same physical link, so are network link pair 425 and 426.”)
30[b]	checking, by the network node, if any one of the one or more additional packets satisfies the criterion;	Swenson discloses checking, by the network node, if any one of the one or more additional packets satisfies the criterion. *See supra at* Claim 1[d], 30[a].
30[c]	responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity; and	Swenson discloses responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity. *See supra at* Claim 1[e], 30[a].
30[d]	responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet	Swenson discloses responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction. *See supra at* Claim 1[f], 30[a].

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	network, in response to the instruction.	

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31[a]	The method according to claim 1, wherein the packet network is a Software Defined Network (SDN),	Swenson discloses the method according to claim 1, wherein the packet network is a Software Defined Network (SDN). For example, Swenson discloses logically coupling a steering device to a network controller via an ICAP interface. A person of ordinary skill in the art would understand that the communication between the steering device and network controller constitutes an SDN. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Swenson is found to not meet this limitation, wherein the packet network is a Software Defined Network (SDN) would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 1. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”)

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		Swenson at [0056] (“FIGS. 4A and 4B each illustrates one embodiment of an example working mode of the network controller for providing selective on-demand real-time network monitoring and subscriber identification. Shown with the network con-troller 140 are the user device 110, the steering device 130, and the origin server 160. The network controller 140 is coupled to the steering device 130 through the steering device interface 316. In one embodiment, the network controller 140 and the steering device 130 communicate with each other using the Internet content adaption protocol (ICAP). The steering device interface 316 executes an ICAP server 406, which interacts with an ICAP client 404 running on the steer-ing device 130. Similar or different protocols may be used for communication between the network controller 140 and the steering device 130 in other embodiments.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Swenson in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 31[a] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses a packet network using the OpenFlow protocol, i.e., wherein the packet network is a Software Defined Network (SDN). A person of ordinary skill in the art would understand that the OpenFlow protocol is used in Software Defined Networks. Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.”) Kempf at [0006] (“A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane

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		communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).”) Kempf at [0007] (“A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively

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		coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.") Kempf at [0038] ("Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC") Kempf at [0039] ("The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.") Kempf at [0040] ("The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used

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		herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0044] ("FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") As another example, Chua discloses techniques and methods related to software defined networks (SDNs). Chua at 1:45-55 ("In general, this disclosure describes techniques related to controlling software defined networks (SDNs). A software defined network is generally a network of interconnected computing devices having forwarding planes or data planes that can be programmed remotely by one or more controller devices. In this manner, the control plane can be physically separate from the data plane (or forwarding plane) for an SDN. These computing devices can have either physical instantiation or virtual (software-only) instantiation without the presence of a hardware appliance. This disclosure describes various techniques related to controlling SDNs.") Chua at 1:56-63 ("In one example, a method includes determining, by a con-troller device for a software defined network, connections between network devices in the software defined network, determining, by the controller device, one or more paths for network traffic between the network devices based on the determination of the connections, and programming, by the controller device, the network devices to direct network traf-fic along the one or more paths.") Chua at 2:14-20 ("In another example, a method includes programming, by a controller device for a software defined network (SDN), a first network device of the SDN to send

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		packets of a packet flow to a service device, and programming, by the controller device, one or more network devices of the SDN to perform a programmed action on packets of the packet flow based on data received from the service device for the packet flow.") Chua at 2:38-48 ("In another example, a method includes programming, by a controller device for a software defined network (SDN), a set of network devices of the SDN to form a path through the SDN and to send data representative of packets sent along the path to the controller device, sending, by the controller device, packets of a packet flow corresponding to the path to one of the set of network devices, determining, by the controller device, whether the set of network devices is properly forwarding the packets of the packet flow along the path based on data received from the set of network devices, and present-ing a report representative of the determination.") Chua at 5:50-6:5 ("SDN 106 generally serves to interconnect various endpoint devices, such as client device 102 and server device 104. In addition, SDN 106 may provide services to network traffic flowing between client device 102 and server device 104. Alternatively, SDN 106 may provide services to client device 102, without further directing traffic to server device 106. For example, administrator 114 may use SDN controller 112 to program network devices of SDN 106 to direct network traffic for client device 102 to one or more of service devices 116. Service devices 116 may include, for example, intrusion detection service (IDS) devices, intrusion prevention system (IPS) devices, web proxies, web servers, web-application firewalls and the like. In other examples, service devices 116 may, additionally or alternatively, include devices for provid-ing services such as, for example, denial of service (DoS) protection, distributed denial of service (DDoS) protection, traffic filtering, wide area network (WAN) acceleration, or other such services. Service devices 116 may also addition-ally or alternatively include malware detection devices, net-work anti-virus devices, network packet capture and analysis devices, honeypot devices, reflector net devices, tar pit devices, domain name service (DNS) and global DNS server devices, mail proxies, and anti-spam devices.")

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31[b]	the packet is routed as part of a data plane and	Swenson discloses the packet is routed as part of a data plane. For example, Swenson discloses routing traffic flows between a user device and server device via a steering device in a network. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Swenson is found to not meet this limitation the packet is routed as part of a data plane would have been obvious to a person having ordinary skill in the art, as explained below. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Swenson in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 31[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses routing packets on a data plane using a control protocol. Kempf at [0006] ("A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than

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		an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).") Kempf at [0007] ("A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by

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		each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”) Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a

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		web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0041] ("The standard EPC control plane entities-the MME, PCRF, and HSS-are likewise deployed in the cloud, along with the control plane parts of the S-GW and P-GW, namely, the S-GW-C and the P-GW-C. The data plane con-sists of standard OpenFlow switches with enhancements as needed for routing GTP packets, rather than IP routers and Ethernet switches. At a minimum, the data plane parts of the S-GW and P-GW, namely, the S-GW-Dand the P-GW-D, and the packet routing part of the E-NodeB in the E-UTRAN require OpenFlow enhancements for GTP routing. Addi-tional enhancements for GTP routing may be needed on other switches within the EPC architecture depending on how much fine grained control over the routing an operator requires.") Kempf at [0078] ("FIG. 15 is a diagram of one embodiment of how the EPC in the cloud computing system enables a managed ser-vices company to manage multiple operator networks out of a single data center. The managed services cloud computing facility 1501 runs separate instances of the EPC control plane for every mobile operator with which the managed services company has a contract. Each EPC instance is in a VPC 1503A,B that isolates the mobile operator's traffic from other tenants in the cloud computing facility 1501 of the data cen-ter. The EPC control plane instance for a mobile operator is connected to the mobile operator's geographically distributed EPC OpenFlow data plane switching fabric 1507 A,B and the mobile operator's base stations through a virtual edge router 1509A,B. The virtual edge router 1509A,B routes traffic from the data center to and from the appropriate mobile operator EPC data plane switching fabric 1507 A,B. In some cases, the mobile operators may even share base stations and EPC switching fabrics, though the example embodiment in FIG. 15 shows a case where the two mobile operators have separate switching fabrics.") Kempf at [0087] ("In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the

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		software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.") Kempf at [0093] ("The virtual port simply removes the GTP tunnel header and forwards the enclosed user data plane packet out the bound physical port.") Kempf at [0101] ("In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)") Kempf at [0145] ("In other embodiments, other control protocols can be utilized in place of OpenFlow as described herein. The use of OpenFlow is presented by way of example and not limita-tion. Other control protocols can also be utilized to manage the communication between the control plane and data plane and configuration of the data plane of the split EPC architec-ture. An example of such a protocol is FORCES, an IETF standard protocol for splitting the control plane and forward-ing plane in networks. The FORCES protocol

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		specification is described in RFC 5810. RFC 5812 describes the architecture of a FORCES forwarding element, the equivalent of an Open-Flow switch. The FORCES protocol itself does not directly support programming routes into the forwarding element, it is, instead, a framework for handling the interaction between the FORCES controller and a FORCES forwarding element. The forwarding element architecture describes how to design the protocol that actually allows a FORCES controller to program a FORCES forwarding element. One skilled in the art would understand that a FORCES based system could include features described herein above in relation to the OpenFlow embodiment, such as the GTP OpenFlow exten-sion, to allow the controller to program the switches for GTP TEID routing.") As another example, Chua discloses forwarding packets over a data plane to various network destinations. Chua at 1:45-55 ("In general, this disclosure describes techniques related to controlling software defined networks (SDNs). A software defined network is generally a network of interconnected computing devices having forwarding planes or data planes that can be programmed remotely by one or more controller devices. In this manner, the control plane can be physically separate from the data plane (or forwarding plane) for an SDN. These computing devices can have either physical instantiation or virtual (software-only) instantiation without the presence of a hardware appliance. This disclosure describes various techniques related to controlling SDNs.") Chua at 1:56-63 ("In one example, a method includes determining, by a con-troller device for a software defined network, connections between network devices in the software defined network, determining, by the controller device, one or more paths for network traffic between the network devices based on the determination of the connections, and programming, by the controller device, the network devices to direct network traf-fic along the one or more paths.") Chua at 23:22-34 ("FIG. 4 illustrates various devices and services organized according to the "control plane" and the "data plane." In general, devices and services of the control plane manage devices of the data plane to cause the devices of the data plane to forward data traffic between various network destinations. In conventional routers, each router includes functionality for both the control plane and the data plane, and the same is true for

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		conventional switches. However, in accordance with the techniques of this disclosure, the control plane can be entirely separated from the data plane, such that an SDN controller, such as SDN controller 112, can program devices of the data plane, such as network switches, to perform the techniques of this disclosure.”) Chua at 23:35:45 (“FIG. 4 is a conceptual diagram illustrating an example flow management system 250 including various components that may operate in accordance with the techniques of this disclo-sure. Flow management system 250 (also referred to as "sys-tem 250") includes control plane 252 and data plane 280. In general, control plane 252 includes components that relate to control information, e.g., routing information relating to packet flows and paths through an SDN. Data plane 280 generally includes components that send, forward, and/or receive data in accordance with control information from components of control plane 252.”) Chua at 24:20-36 (“In accordance with the techniques of this disclosure, flow management server 256 programs network switches 282, based on connections between network switches 282, to form paths through an SDN. For example, flow management server 256 may program network switches 282 to establish a path between TCP client 284 and server 288, and/or a path between TCP client 284 and multicast source 286. In some examples, flow management server 256 may program net-work switches 282 to define multiple paths, e.g., a primary path and one or more backup paths, as discussed above. Likewise, flow management server 256 may send test traffic through network switches 282 to test one or more of the paths. Data plane 280 may include one or more service devices (such as web proxy devices, IDS devices, and/or web serv-ers), to which network switches 282 may direct network packets. Server 288 may represent a service device of an SDN controlled by control plane 252, in some examples.”)

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31[c]	the network node communication with the controller serves as a control plane.	Swenson discloses the network node communication with the controller serves as a control plane. For example, Swenson discloses communication between the steering device and controller. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Swenson is found to not meet this limitation, the network node communication with the controller serves as a control plane would have been obvious to a person having ordinary skill in the art, as explained below. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Swenson in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 31[c] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses communication between network elements and an OpenFlow controller over a control plane. Kempf at [0006] ("A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network

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		elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).") Kempf at [0007] ("A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality

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		of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”) Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”) Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching

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		specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0041] (“The standard EPC control plane entities-the MME, PCRF, and HSS-are likewise deployed in the cloud, along with the control plane parts of the S-GW and P-GW, namely, the S-GW-C and the P-GW-C. The data plane con-sists of standard OpenFlow switches with enhancements as needed for routing GTP packets, rather than IP routers and Ethernet switches. At a minimum, the data plane parts of the S-GW and P-GW, namely, the S-GW-Dand the P-GW-D, and the packet routing part of the E-NodeB in the E-UTRAN require OpenFlow enhancements for GTP routing. Addi-tional enhancements for GTP routing may be needed on other switches within the EPC architecture depending on how much fine grained control over the routing an operator requires.”) Kempf at [0078] (“FIG. 15 is a diagram of one embodiment of how the EPC in the cloud computing system enables a managed ser-vices company to manage multiple operator networks out of a single data center. The managed services cloud computing facility 1501 runs separate instances of the EPC control plane for every mobile operator with which the managed services company has a contract. Each EPC instance is in a VPC 1503A,B that isolates the mobile operator's traffic from other tenants in the cloud computing facility 1501 of the data cen-ter. The EPC control plane instance for a mobile operator is connected to the mobile operator's geographically distributed EPC OpenFlow data plane switching fabric 1507 A,B and the mobile operator's base stations through a virtual edge router 1509A,B. The virtual edge router 1509A,B routes traffic from the data center to and from the appropriate mobile operator EPC data plane switching fabric 1507 A,B. In some cases, the mobile operators may even share base stations and EPC switching fabrics, though the example embodiment in FIG. 15 shows a case where the two mobile operators have separate switching fabrics.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and

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		by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0093] (“The virtual port simply removes the GTP tunnel header and forwards the enclosed user data plane packet out the bound physical port.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0145] (“In other embodiments, other control protocols can be utilized in place of OpenFlow as described herein. The use of OpenFlow is presented by way of example and not limita-tion. Other control protocols can also be utilized to manage the communication between the control plane and data plane and configuration of the data plane of the split EPC architec-ture. An example of such a protocol is FORCES, an IETF standard protocol

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		for splitting the control plane and forward-ing plane in networks. The FORCES protocol specification is described in RFC 5810. RFC 5812 describes the architecture of a FORCES forwarding element, the equivalent of an Open-Flow switch. The FORCES protocol itself does not directly support programming routes into the forwarding element, it is, instead, a framework for handling the interaction between the FORCES controller and a FORCES forwarding element. The forwarding element architecture describes how to design the protocol that actually allows a FORCES controller to program a FORCES forwarding element. One skilled in the art would understand that a FORCES based system could include features described herein above in relation to the OpenFlow embodiment, such as the GTP OpenFlow exten-sion, to allow the controller to program the switches for GTP TEID routing.”) As another example, Chua discloses the network device’s communication with the SDN controller over the control plane as controlling and programming the network devices to direct network traffic along one or more paths. Chua at 1:64-2:5 (“In another example, a controller device for a software defined network includes one or more interfaces for commu-nicating with network devices in the software defined net-work, and one or more processors configured to determine connections between the network devices, determine one or more paths for network traffic between the network devices based on the determination of the connections, and program the network devices to direct network traffic along the one or more paths.”) Chua at 2:21-29 (“In another example, a controller device for a software defined network (SDN) includes one or more network inter-faces configured to communicate with network devices of the SDN, and one or more processors configured to program a first network device of the SDN to send packets of a packet flow to a service device, and program one or more network devices of the SDN to perform a programmed action on packets of the packet flow based on data received from the service device for the packet flow.”) Chua at 2:49-61 (“In another example, a controller device for a software defined network (SDN) includes one or more network interfaces configured to communicate with network devices of the SDN, and one or more processors configured to program a set of network devices of the SDN to form a path through the SDN and to send data representative of

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		packets sent along the path to the controller device, send, via one of the network interfaces, packets of a packet flow corresponding to the path to one of the set of network devices, determine whether the set of network devices is properly forwarding the packets of the packet flow along the path based on data received from the set of network devices, and present a report representative of the determination.”) Chua at 23:62-24:4 (“OpenFlow is an example of an SDN protocol. That is, in some examples, SDN controller 270 may conform to the OpenFlow protocol. However, it should be understood that other protocols may be used in conjunction with a software defined network. In general, any protocol that gives access to the forwarding plane or data plane of a networking (e.g., a switch or router) to a remote device over a network may be used in accordance with the techniques of this disclo-sure, other example protocols include XMPP, RESTful APIs, Cisco OnePK, IETF I2RS (Interface to Routing Systems).”)

EXHIBIT D-3
Defendant's Preliminary Invalidity Contentions
Orckit Corporation v. Cisco Systems, Inc., 2:22-cv-00276-JRG-RSP

<u>Chart for U.S. Patent 10,652,111 ("the '111 Patent")</u>
<u>U.S. Patent Publication No. 2014/0140211 to Chandrasekaran et al. ("Chandrasekaran")</u>

As shown in the chart below, all Asserted Claims of the '111 Patent are invalid under (1) AIA-35 U.S.C. § 102 (a) because Chandrasekaran meets each element of those claims, and/or (2) 35 U.S.C. § 103 because Chandrasekaran renders those claims obvious either alone, or in combination with the knowledge of a person having ordinary skill in the art, and in further combination with the references specifically identified below and in the following claim chart and/or one or more references identified in Defendant's Preliminary Invalidity Contentions. The following quotations and diagrams come from Chandrasekaran titled "Classification of Traffic For Application Aware Policies In A Wireless Network", which was filed on November 16, 2012, and published on May 22, 2014.

Motivations to combine the disclosures in Chandrasekaran with disclosures in other publications known in the art, as explained in this chart, include at least the similarity in subject matter between the references to the extent they concern methods relating to routing certain network traffic to entities for further analysis and inspection. Insofar as the references cite other patents or publications, or suggest additional changes, one of ordinary skill in the art would look beyond a single reference to other references in the field.

These invalidity contentions are based on Defendant's present understanding of the Asserted Claims, and Orckit's apparent construction of the claims in its November 3, 2022 Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1, and Orckit's January 19, 2023 First Amended Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1 (Orckit's "Infringement Disclosures"), which is deficient at least insofar as it fails to cite any documents or identify accused structures, acts, or materials in the Accused Products with particularity. Defendant does not agree with Orckit's application of the claims, or that the claims satisfy the requirements of 35 U.S.C. § 112. Defendant's contentions herein are not, and should in no way be seen as, admissions or adoptions as to any particular claim scope or construction, or as any admission that any particular element is met by any accused product in any particular way. Defendant objects to any attempt to imply claim construction from this chart. Defendant's prior art invalidity contentions are made in a variety of alternatives and do not represent Defendant's agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein.

The following contentions are subject to revision and amendment pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules, and the Orders of record in this matter subject to further investigation and discovery regarding the prior art and the Court's construction of the claims at issue.

No.	'111 Patent Claim 1	Chandrasekaran
1[preamble]	A method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising:	Chandrasekaran discloses a method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising. For example, Chandrasekaran discloses a method used in a network in which packets are sent between mobile devices in which the network includes a controller in communication with mobile devices, through an external access point. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Chandrasekaran at Abstract ("In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.") Chandrasekaran at [0007] ("In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.") Chandrasekaran at [0012] ("Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN

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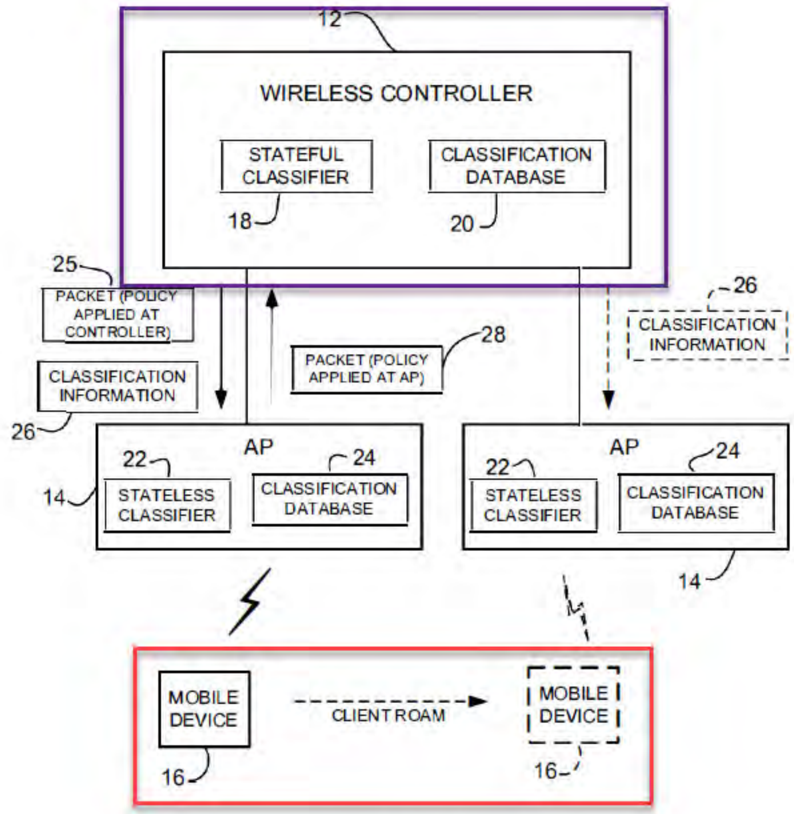
		(wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at Figure (annotations added)

No.	'111 Patent Claim 1	Chandrasekaran
		 FIGURE 1
1[a]	sending, by the controller to the network node over the packet network, an instruction and a	Chandrasekaran discloses sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion. For example, Chandrasekaran discloses a controller sending classification information, including flow information and rules, to an access point.

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	packet-applicable criterion;	Chandrasekaran at Abstract (“In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.”) Chandrasekaran at [0007] (“In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.”) Chandrasekaran at [0008] (“In another embodiment, an apparatus generally comprises a stateful classifier for performing stateful appli-cation classification at a controller, a classification database for storing classification information, and a processor for transmitting the classification information to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classification information to perform stateless application classification and apply policies to pack-ets received from a mobile device.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”)

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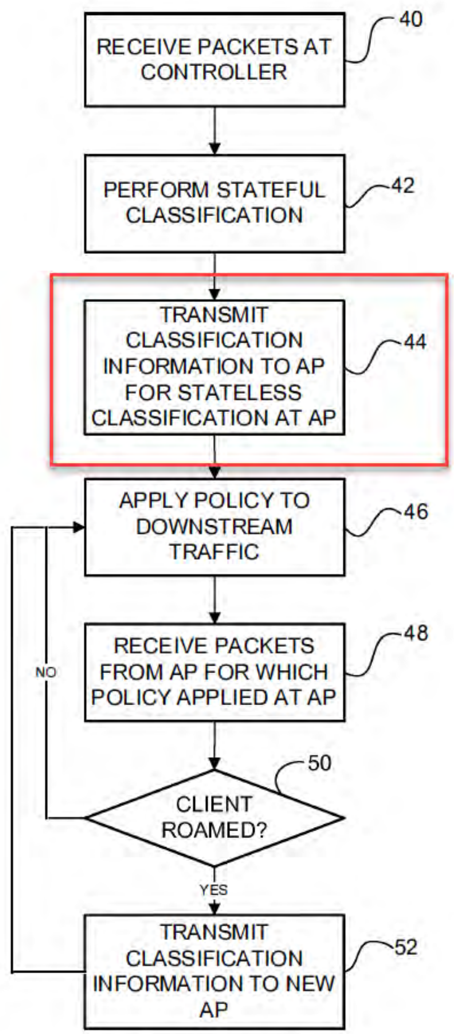
		Chandrasekaran at [0022] (“The wireless controller 12 and AP 14 further include classification databases 20, 24, respectively, for storing clas-sification information. The classification database 20 at the controller 12 stores classification information obtained by the stateful classifier 18. The classification database 24 at the AP 14 stores classification information 26 transmitted to the AP from the controller 12. The classification information stored at the databases 20, 24 may include, for example, flow infor-mation, stateless rules, and policies, as described below.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at theAP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at Figure 3 (annotations added)

No.	’111 Patent Claim 1	Chandrasekaran
		 FIGURE 3
1[b]	receiving, by the network node from the controller, the	Chandrasekaran discloses receiving, by the network node from the controller, the instruction and the criterion.

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	instruction and the criterion;	*See supra at* 1[a].
1[c]	receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity;	Chandrasekaran discloses receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity. For example, Chandrasekaran discloses an access point that receives data packets and traffic over a packet network from a first mobile device that is destined for another endpoint. Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control

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		device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0015] (“The mobile device 16 may be any suitable equip-ment that supports wireless communication, including for example, a mobile phone, personal digital assistant, portable computing device, laptop, tablet, multimedia device, or any other wireless device. The mobile device 16 and access point 14 are configured to perform wireless communication according to a wireless network communication protocol such as IEEE 802.11/Wi-Fi.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”)

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1[d]	checking, by the network node, if the packet satisfies the criterion;	Chandrasekaran discloses checking, by the network node, if the packet satisfies the criterion. For example, Chandrasekaran discloses a stateless classifier in the access point, that performs packets classification to determine if the packet satisfies the information in the policy. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, checking, by the network node, if the packet satisfies the criterion would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at Abstract (“In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.”) Chandrasekaran at [0007] (“In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.”) Chandrasekaran at [0008] (“In another embodiment, an apparatus generally comprises a stateful classifier for performing stateful appli-cation classification at a controller, a classification database for storing classification information, and a processor for transmitting the classification information to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classification information to perform stateless application classification and apply policies to pack-ets received from a mobile device.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful

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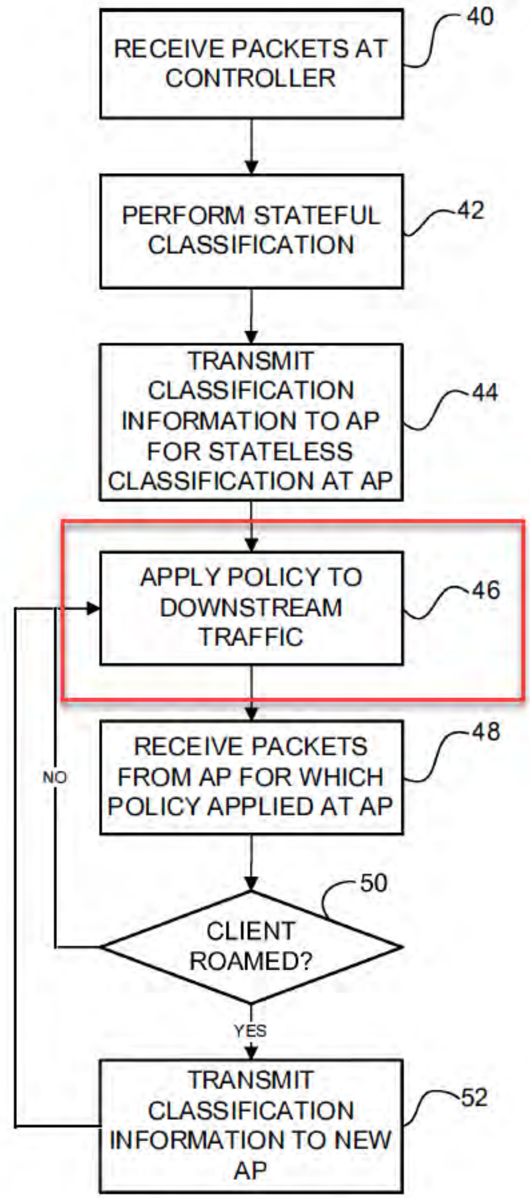
		classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0018] (“The stateless classifier 22 at the AP 14 uses rules that can act on a per packet basis in the flow. Stateless classifica-tion (also referred to as packet classification) is based on individual packet inspection (e.g., 5 tuple, pattern matching) without knowledge of any related stream of packets, flows, sessions, or protocols.”) Chandrasekaran at Figure 3 (annotations added)

RECEIVE PACKETS AT CONTROLLER
40
PERFORM STATEFUL CLASSIFICATION
42
TRANSMIT CLASSIFICATION INFORMATION TO AP FOR STATELESS CLASSIFICATION AT AP
44
APPLY POLICY TO DOWNSTREAM TRAFFIC
46
RECEIVE PACKETS FROM AP FOR WHICH POLICY APPLIED AT AP
48
NO
CLIENT ROAMED?
50
YES
TRANSMIT CLASSIFICATION INFORMATION TO NEW AP
52

FIGURE 3

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		Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 1[d] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses determining by the network element if the packet header field match an associated action in the flow table. Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”)

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		Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is

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		executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) As another example, Swenson discloses determining by the steering device packet flows that match one or more signatures, conditions, or criteria of the packet. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic

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		data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network

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		response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which

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		inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.") Swenson at [0079] ("In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.")
1[e]	responsive to the packet not satisfying the criterion, sending, by the network node	Chandrasekaran discloses responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity.

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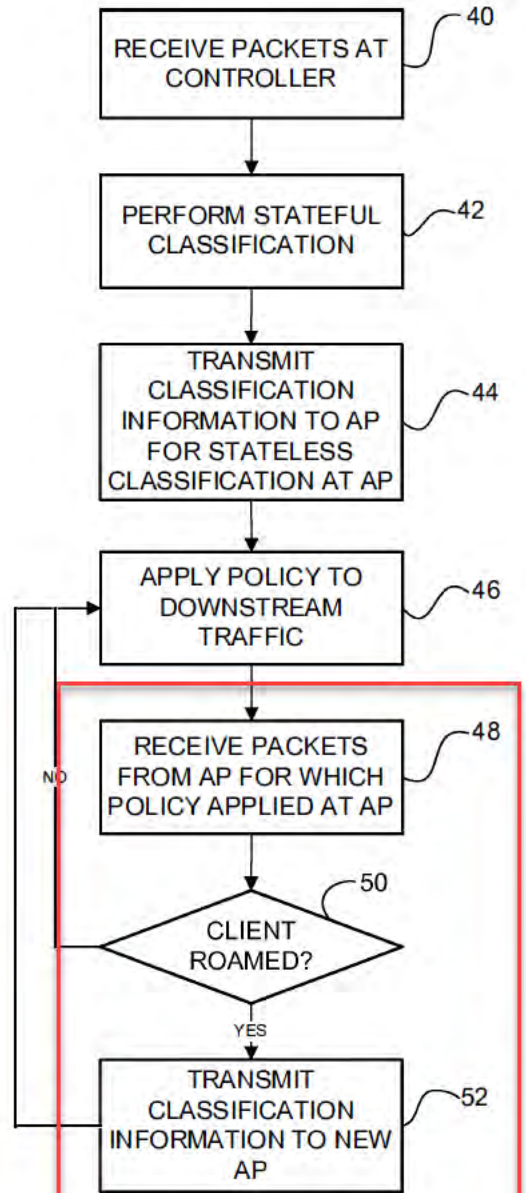
	over the packet network, the packet to the second entity; and	For example, Chandrasekaran discloses in response to particular policies, not sending the packet to the controller and sending the packet to the second entity. A person of ordinary skill in the art would understand that Chandrasekaran discloses a number of embodiments in which a packet may not be sent to the controller in response to not satisfying the criterion and sending the packet to the second entity. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at [0032] (“It is to be understood that the process illustrated in FIG. 3 and described above is only an example and that steps may be modified, deleted, added, or combined without departing from the scope of the embodiments. For example, if traffic from the network destined for the mobile device 16 does not pass through the controller 12, policies are not applied by the controller for downstream traffic as shown in step 46. Also, if the policy applied at the AP 14 is to drop packets, those packets will not be received at the controller as shown in step 48.”) Chandrasekaran at Figure 3 (annotations added)

		RECEIVE PACKETS AT CONTROLLER
40
PERFORM STATEFUL CLASSIFICATION
42
TRANSMIT CLASSIFICATION INFORMATION TO AP FOR STATELESS CLASSIFICATION AT AP
44
APPLY POLICY TO DOWNSTREAM TRAFFIC
46
RECEIVE PACKETS FROM AP FOR WHICH POLICY APPLIED AT AP
48
NO
CLIENT ROAMED?
50
YES
TRANSMIT CLASSIFICATION INFORMATION TO NEW AP
52 FIGURE 3

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		Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 1[e] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses sending the packet from the network element to the destination device in response to the packet not matching the action in the flow table. Kempf at [0044] ("FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.") Kempf at [0046] ("A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.")

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		Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is

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		executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0053] (“In one embodiment, a group table can be supported in conjunction with the OpenFlow 1.1 protocol. Group tables enable a method for allowing a single flow match to trigger forwarding on multiple ports. Group table entries consist of four fields: a group identifier, which is a 32 bit unsigned integer identifying the group; a group type that determines the group's semantics; counters that maintain statistics on the group; and an action bucket list, which is an ordered list of action buckets, where each bucket contains a set of actions to execute together with their parameters.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at Figure 5 (annotation added)

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		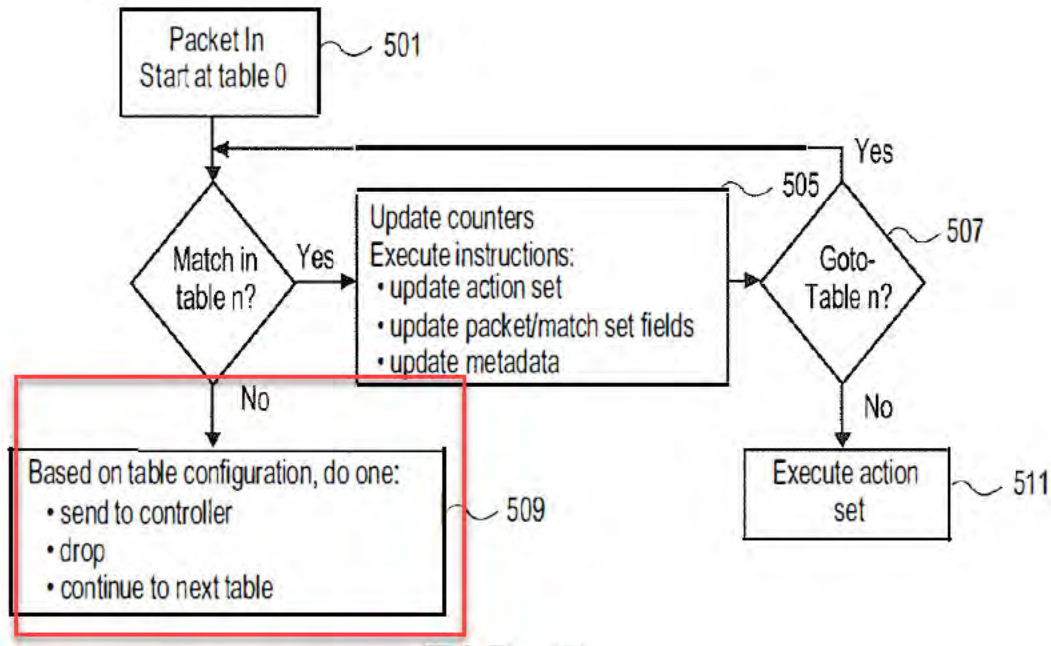 FIG. 5 Kempf at Figure 2 (annotation added)

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		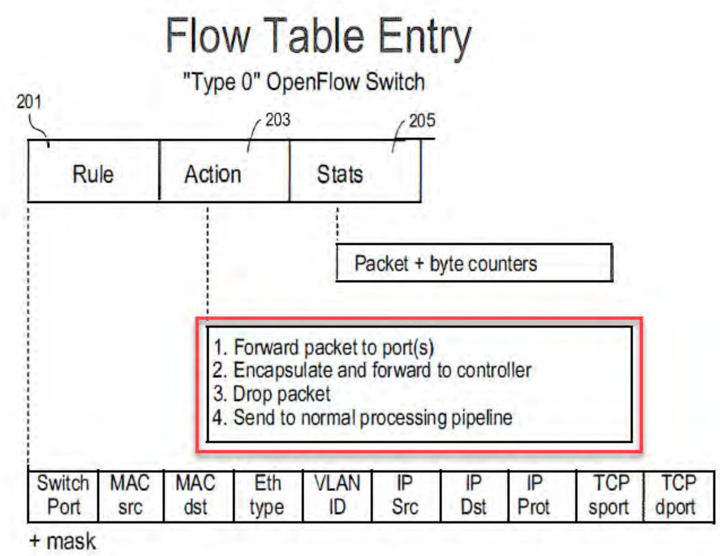 **FIG. 2** As another example, Swenson discloses monitoring and categorizing network traffic by the steering device based on instructions and desired criteria sent by the network controller to determine if packet flows require further inspection. Based on the instruction and desired criteria, the network controller monitors and optimizes only a subset of network traffic. Packet flows that do not meet the desired criteria from the network controller's instructions at the steering device are not sent for further inspection and are sent to their originally intended destination. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering

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		device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0038] ("Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and

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		optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.") Swenson at [0042] ("The network controller 140 collects real-time statis-tical data on the network flows from core network side with-out probes deployed in the RAN network. The statistical data is stored and compared against historical flow data to estimate level of congestion and available network bandwidth. Instead of collecting traffic statistics for every flow and every session, the network controller 140 samples only large flows involving media objects such as videos and images above a certain size (e.g., above 50 kB). The network controller 140 can choose to be a pass-through device to monitor the large flows as well as to determine whether to optimize the flows. Measuring only larger flows has the advantage to mitigate corruptions caused by origin server latency and network glitches. Furthermore, focusing on the large flows helps the network controller to reduce the background noise and to increase noise-to-signal ratio in bandwidth measuring by removing the impact of millions of tiny or small flows with delivery time in millisec-onds. Therefore the reliability of bandwidth estimation and congestion detection is much higher.") Swenson at [0045] ("The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.") Swenson at [0059] ("In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images.

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		When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this

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		case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.") Swenson at [0069] ("FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.")
1[f]	responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the	Chandrasekaran discloses responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity. For example, Chandrasekaran discloses the controller receiving traffic for which initial classifications have been applied by the access node.

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	instruction and is other than the second entity.	Chandrasekaran at [0016] ("The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.") Chandrasekaran at [0031] ("FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).") Chandrasekaran at [0033] ("The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or

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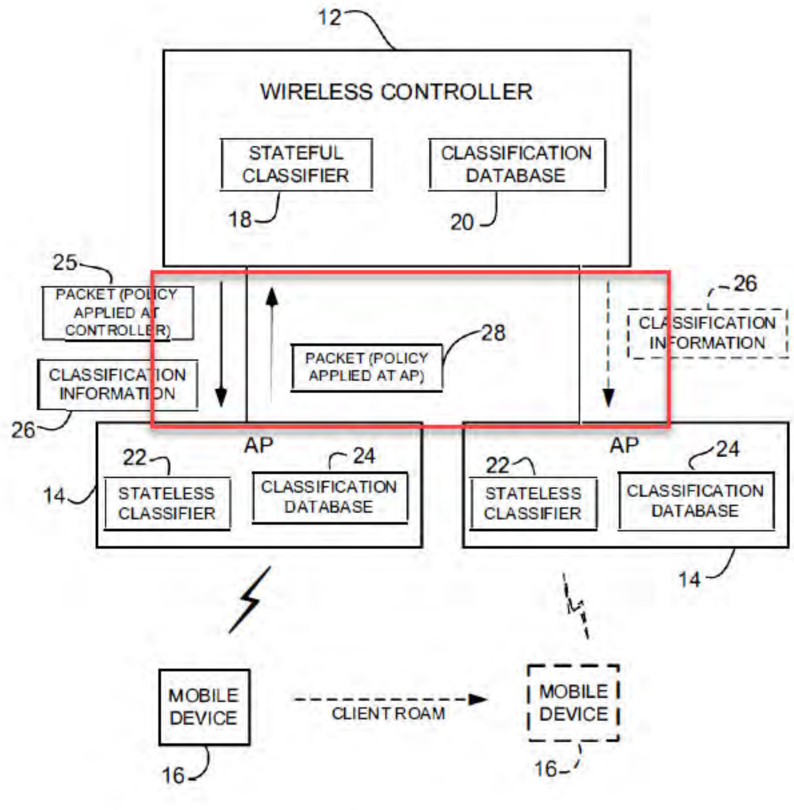
		rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at Figure 1 (annotations added)  FIGURE 1

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2[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Chandrasekaran discloses the method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction. For example, Chandrasekaran discloses policies, which may include classification, copying, or dropping policies or actions. A person of ordinary skill in the art would understand that Chandrasekaran discloses many different policies, for example, probing, mirroring, or terminating packet flows. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the instruction is ‘probe’, ‘mirror', or ‘terminate’ instruction would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at Abstract (“In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.”) Chandrasekaran at [0007] (“In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.”) Chandrasekaran at [0008] (“In another embodiment, an apparatus generally comprises a stateful classifier for performing stateful appli-cation classification at a controller, a classification database for storing classification information, and a processor for transmitting the classification information to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classification information to perform stateless application classification and apply policies to pack-ets received from a mobile device.”)

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		Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 2(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Chua discloses programming network nodes with redirecting, mirroring, and blocking programmed actions. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of

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		Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header") Chua at 28:7-32 ("In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data, forward packets of the packet flow to a destination of the packet flow, forward packets of malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.")

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		As another example, Copeland discloses probing, copying, and terminating rules configured on the network device. Copeland at [0057] ("In accordance with an aspect of the invention, a flow is considered terminated after a predetermined period of time has elapsed on a particular connection or port. For example, if HTTP Web traffic on port 80 ceases for a predetermined period of time, but other traffic begins to occur on port 80 after the expiration of that predetermined time period, it is considered that a new flow has begun, and the system responds accordingly to assign a new flow number and track the statistics and characteristics thereof. In the disclosed embodiment, the predetermined time period is 330 seconds, but those skilled in the art will understand that this time is arbitrary and may be heuristically adjusted.") Copeland at [0082] ("Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.") Copeland at [0093] ("As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.") Copeland at [0095] ("When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an

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		ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.") Copeland at [0099] ("As another example, if a particular host sends a large number of SYN packets to a target host and in response receives numerous R packets from the targeted host, a potential TCP probe is indicated. Likewise, numerous UDP packets sent from one host to a targeted host and numerous ICMP "port unavailable" packets received from the targeted host indicate a potential UDP probe. A stealth probe is indicated by multiple packets from the same source port number sent to different port numbers on a targeted host.") Copeland at [0107] ("A flow is terminated if no communications occur between the two IP addresses and the one low port (e.g. port 80) for 330 seconds. Most Web browsers or a TCP connec-tion send a reset packet (i.e. a packet with the R flag set) if no communications are sent or received for 5 minutes. An analysis can determine if the flow is abnormal or not for HTTP communications.") Copeland at [0123] ("Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.") Copeland at [0145] ("A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.") Copeland at [0158] ("Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the

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		ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.”)
2[b]	upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller.	Chandrasekaran discloses upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller. For example, Chandrasekaran discloses dropping packets by the access point in response to a dropping instruction. Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0032] (“It is to be understood that the process illustrated in FIG. 3 and described above is only an example and that steps may be modified, deleted, added, or combined without departing from the scope of the embodiments. For example, if traffic from the network destined for the mobile device 16 does not pass through the controller 12, policies are not applied by the controller for downstream traffic as shown in step 46. Also, if the policy applied at the AP 14 is to drop packets, those packets will not be received at the controller as shown in step 48.”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after

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		the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”)

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3[a]	The method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction, and	Chandrasekaran discloses the method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction. *See supra* at 2(a).
3[b]	upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller.	Chandrasekaran discloses upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller. For example, Chandrasekaran discloses policies which may include copying, policies or actions. A person of ordinary skill in the art would understand that Chandrasekaran discloses many different policies, for example mirroring packet flows. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, upon receiving by the network node the ‘mirror' instruction and responsive to the packet satisfying the criterion, method further comprising sending the packet, by the network node, to the second entity and to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at Abstract (“In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification

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		information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.") Chandrasekaran at [0007] ("In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.") Chandrasekaran at [0008] ("In another embodiment, an apparatus generally comprises a stateful classifier for performing stateful appli-cation classification at a controller, a classification database for storing classification information, and a processor for transmitting the classification information to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classification information to perform stateless application classification and apply policies to pack-ets received from a mobile device.") Chandrasekaran at [0023] ("In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.") Chandrasekaran at [0033] ("The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12

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		sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 3(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Chua discloses a mirror program in response to an indication based on the packet header, in which the network devices mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat.

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		Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header") Chua at 16:23-44 ("More particularly, control unit 130 may configure any of service devices 116 to send data representative of a particular event to SDN controller 112, and control unit 130 may auto-matically reprogram one or more network devices of SDN 106 in response to such data. For example, security monitor-ing applications of service devices 116 may determine that a specific source port, destination port, source IP address, des-tination IP address, or the like should be acted upon. Alter-natively, security monitoring applications may determine that, due to content or deep packet inspection, a specific type of traffic is malicious and should be blocked. In either case, the corresponding one of service devices 116 may send a message to SDN controller 112 representative of these deter-minations. As yet another example, a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics. SDN controller 112 may respond by programming network devices of SDN 106 to perform a programmed action, such as allowing corresponding traffic, blocking corresponding traf-fic, mirroring corresponding traffic, redirecting correspond-ing traffic.") Chua at 28:7-32 ("In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data, forward packets of the packet flow to a destination of the packet flow, forward packets of malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of

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		the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.”) As another example, Swenson discloses a counting mode instructed by the network controller to the steering device for monitoring and optimizing, in which the steering device forwards the packet flow to the user device/origin server and at the same time, sending the packet flow to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media

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		requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0064] (“Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net-work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”)

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		Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at [0072] (“In one embodiment, if the video optimizer 150 failed to retrieve user requested video file from the origin server 160, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 624, which is intercepted by the steering device 130 only. The steering device 130 forwards the video to the user device 110 and at the same time reports the flow size to the network controller 140 for monitoring purpose.”)

No.	’111 Patent Claim 4	Chandrasekaran
4[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Chandrasekaran discloses the method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction. *See supra* at 2(a).

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4[b]	upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller;	Chandrasekaran discloses upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller. For example, Chandrasekaran discloses classification policies that involve sending the packet to the controller from the access point, in response to a classification policy. Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The

No.	’111 Patent Claim 4	Chandrasekaran
		controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at Figure 1 (annotations added)

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		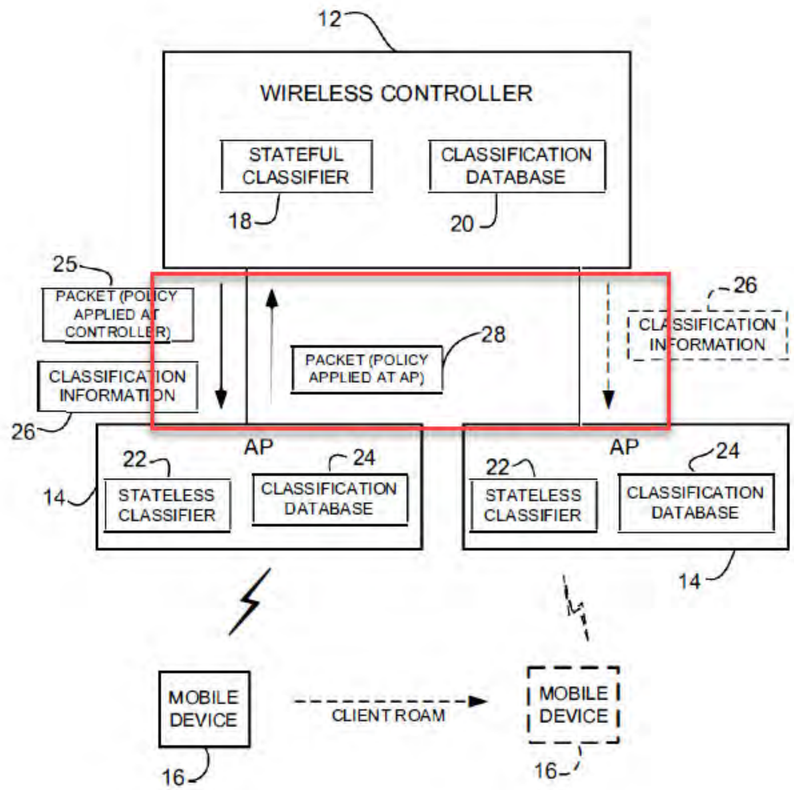 FIGURE 1
4[c]	responsive to receiving the packet, analyzing the packet, by the controller;	Chandrasekaran discloses responsive to receiving the packet, analyzing the packet, by the controller. For example, Chandrasekaran discloses a controller performing stateful application classification, in response to receiving the packet.

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		Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be

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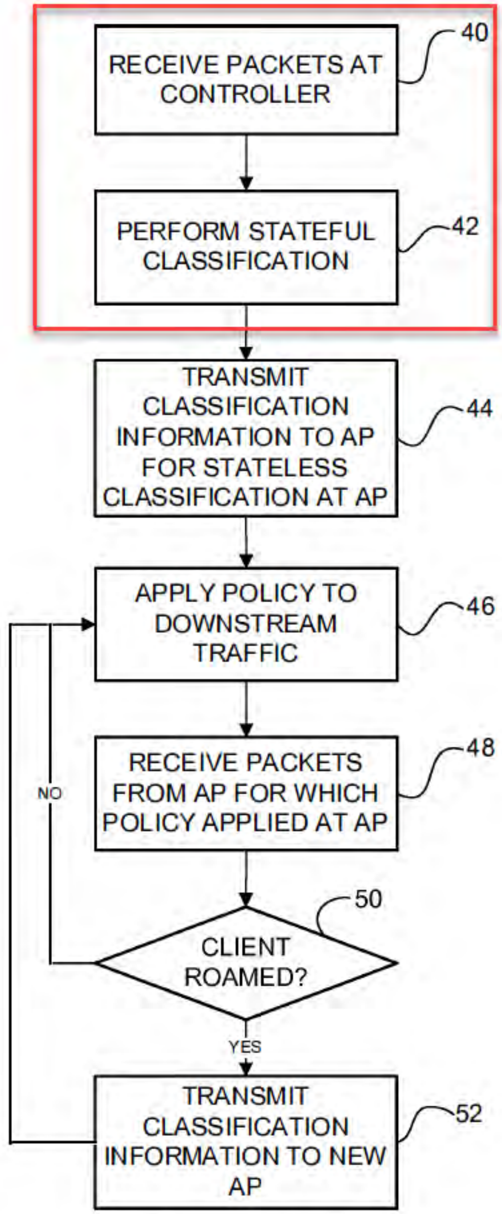
		configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at Figure 3 (annotations added)

		 RECEIVE PACKETS AT CONTROLLER 40 PERFORM STATEFUL CLASSIFICATION 42 TRANSMIT CLASSIFICATION INFORMATION TO AP FOR STATELESS CLASSIFICATION AT AP 44 APPLY POLICY TO DOWNSTREAM TRAFFIC 46 RECEIVE PACKETS FROM AP FOR WHICH POLICY APPLIED AT AP 48 NO CLIENT ROAMED? 50 YES TRANSMIT CLASSIFICATION INFORMATION TO NEW AP 52 FIGURE 3

No.	’111 Patent Claim 4	Chandrasekaran
4[d]	sending the packet, by the controller, to the network node; and	Chandrasekaran discloses sending the packet, by the controller, to the network node. For example, Chandrasekaran discloses transmitting the packet and information from the controller to the access point. Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at theAP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at Figure 1 (annotations added)

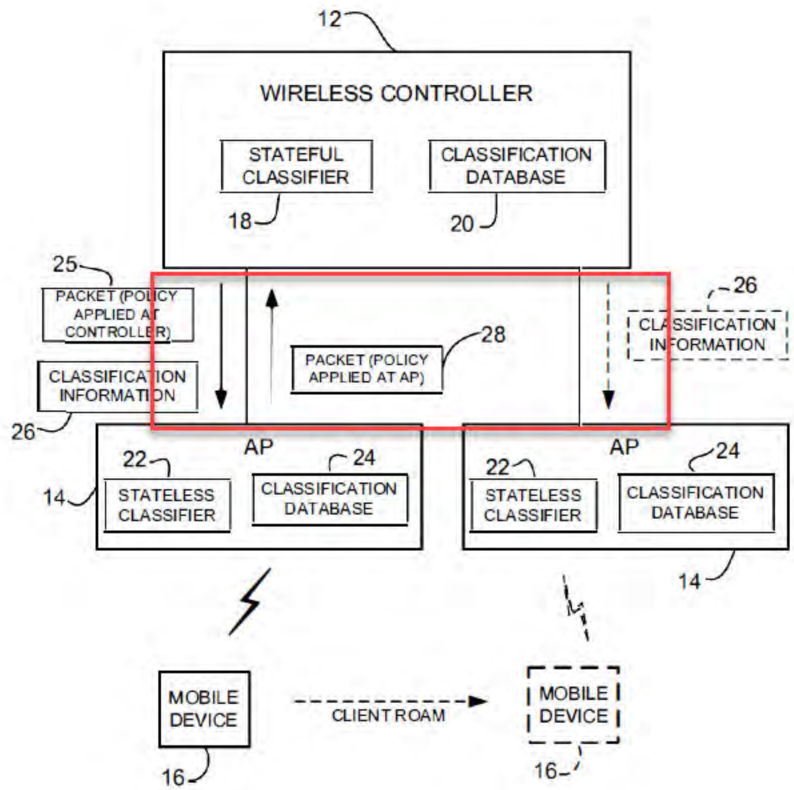
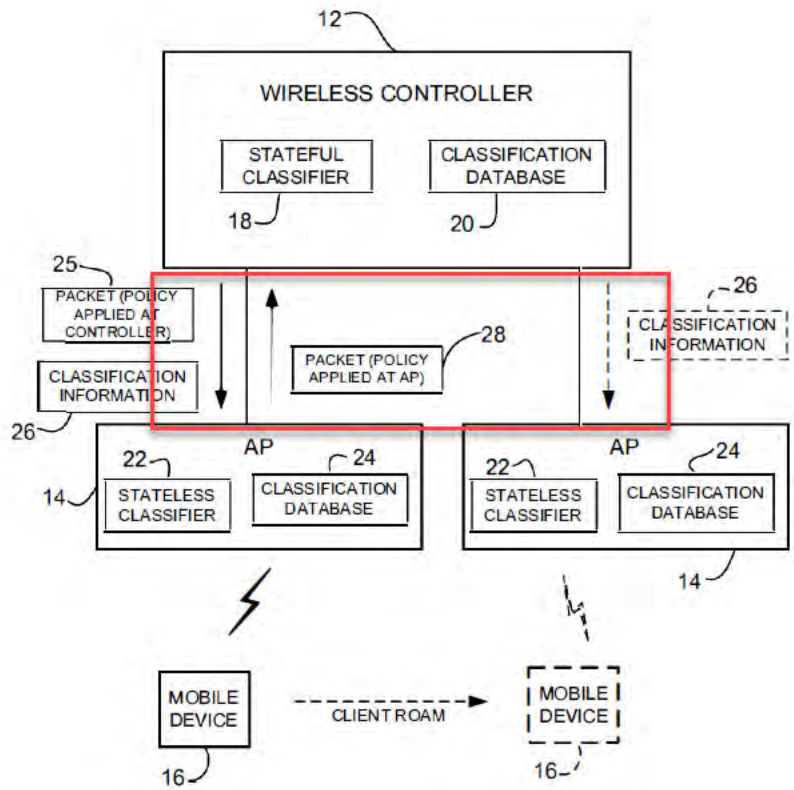
<table>
<tr><th>No.</th><th>’111 Patent Claim 4</th><th>Chandrasekaran</th></tr>
<tr><td></td><td></td><td>


FIGURE 1
</td></tr>
<tr><td>4[e]</td><td>responsive to receiving the packet, sending the packet, by the network node, to the second entity.</td><td>Chandrasekaran discloses responsive to receiving the packet, sending the packet, by the network node, to the second entity.

For example, Chandrasekaran discloses sending the packet by the access point to the endpoint, after receiving the packet.</td></tr>
</table>

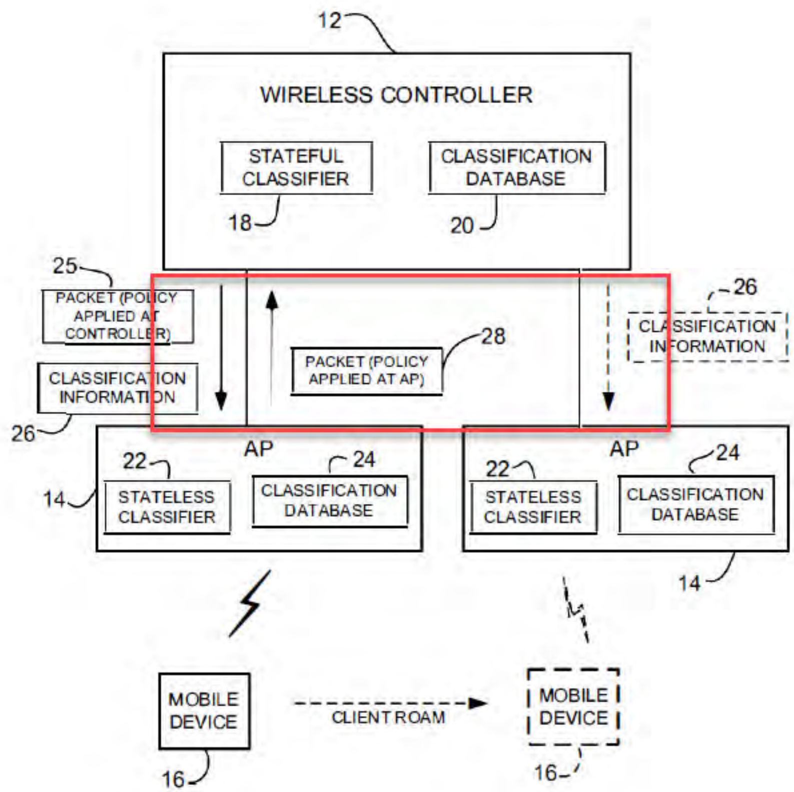
No.	’111 Patent Claim 4	Chandrasekaran
		Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example

No.	'111 Patent Claim 4	Chandrasekaran
		shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.") Chandrasekaran at [0015] ("The mobile device 16 may be any suitable equip-ment that supports wireless communication, including for example, a mobile phone, personal digital assistant, portable computing device, laptop, tablet, multimedia device, or any other wireless device. The mobile device 16 and access point 14 are configured to perform wireless communication according to a wireless network communication protocol such as IEEE 802.11/Wi-Fi.") Chandrasekaran at [0016] ("The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.") Chandrasekaran at Figure 1 (annotations added)

No.	’111 Patent Claim 4	Chandrasekaran
		 FIGURE 1

No.	’111 Patent Claim 5	Chandrasekaran
5	The method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller.	Chandrasekaran discloses the method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller. For example, Chandrasekaran discloses sending the packet or information about the packet to the controller by the access point, in response to performing the classification policy. *See supra* at Claim 1. Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”)

No.	'111 Patent Claim 5	Chandrasekaran
		Chandrasekaran at [0014] ("The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.") Chandrasekaran at [0015] ("The mobile device 16 may be any suitable equip-ment that supports wireless communication, including for example, a mobile phone, personal digital assistant, portable computing device, laptop, tablet, multimedia device, or any other wireless device. The mobile device 16 and access point 14 are configured to perform wireless communication according to a wireless network communication protocol such as IEEE 802.11/Wi-Fi.") Chandrasekaran at [0016] ("The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.")

No.	’111 Patent Claim 5	Chandrasekaran
		Chandrasekaran at Figure 1 (annotations added)  FIGURE 1

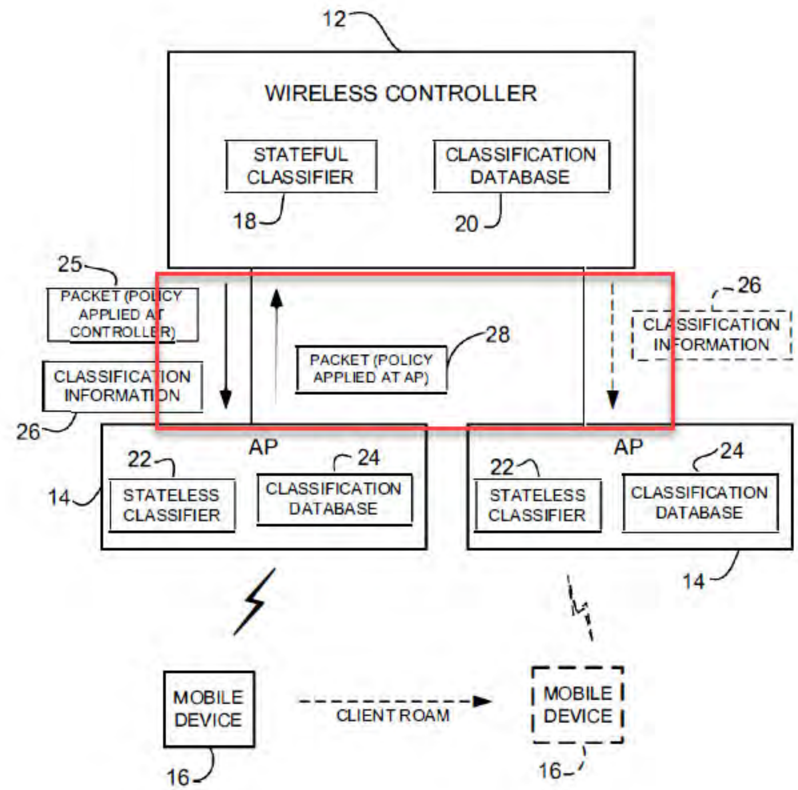
No.	’111 Patent Claim 6	Chandrasekaran
6	The method according to claim 5, further	Chandrasekaran discloses the method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory.

No.	’111 Patent Claim 6	Chandrasekaran
	comprising storing the received packet or a portion thereof, by the controller, in a memory.	For example, Chandrasekaran discloses storing the packet or information about the packet in the memory of the controller. *See supra* at Claim 5. Chandrasekaran at [0022] (“The wireless controller 12 and AP 14 further include classification databases 20, 24, respectively, for storing clas-sification information. The classification database 20 at the controller 12 stores classification information obtained by the stateful classifier 18. The classification database 24 at the AP 14 stores classification information 26 transmitted to the AP from the controller 12. The classification information stored at the databases 20, 24 may include, for example, flow infor-mation, stateless rules, and policies, as described below.”) Chandrasekaran at [0024] (“It is to be understood that the network shown in FIG. 1 and described herein is only an example and that other networks having different components or configurations may be used, without departing from the scope of the embodi-ments. For example, there may be any number of APs 14 in communication with the controller 12 for supporting any number of mobile devices 16. Also, as described above, the controller 12 may be located at various locations and devices in the network.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”)

No.	’111 Patent Claim 7	Chandrasekaran
7	The method according to claim 5, further comprising responsive	Chandrasekaran discloses the method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.

No.	’111 Patent Claim 7	Chandrasekaran
	to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.	For example, Chandrasekaran discloses sending information about the packet to the controller by the access point, in response to performing the classification policy. *See supra* at Claim 5. Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at theAP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to

No.	’111 Patent Claim 7	Chandrasekaran
		classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at Figure 1 (annotations added)

No.	’111 Patent Claim 7	Chandrasekaran
		 FIGURE 1

No.	’111 Patent Claim 8	Chandrasekaran
8[a]	The method according to claim 7, wherein the portion of the packet	Chandrasekaran discloses the method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes.

No.	’111 Patent Claim 8	Chandrasekaran
	consists of multiple consecutive bytes, and	For example, Chandrasekaran discloses information about a packet consisting of multiple bytes. *See supra* at Claim 7. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology

No.	’111 Patent Claim 8	Chandrasekaran
		used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0035]-[0044] (“WebEx Video: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x50 WebEx Voice: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x48”)

No.	’111 Patent Claim 8	Chandrasekaran
8[b]	wherein the instruction comprises identification of the consecutive bytes in the packet.	Chandrasekaran discloses wherein the instruction comprises identification of the consecutive bytes in the packet. For example, Chandrasekaran discloses the classification policy identifying the bytes in the packet. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”)

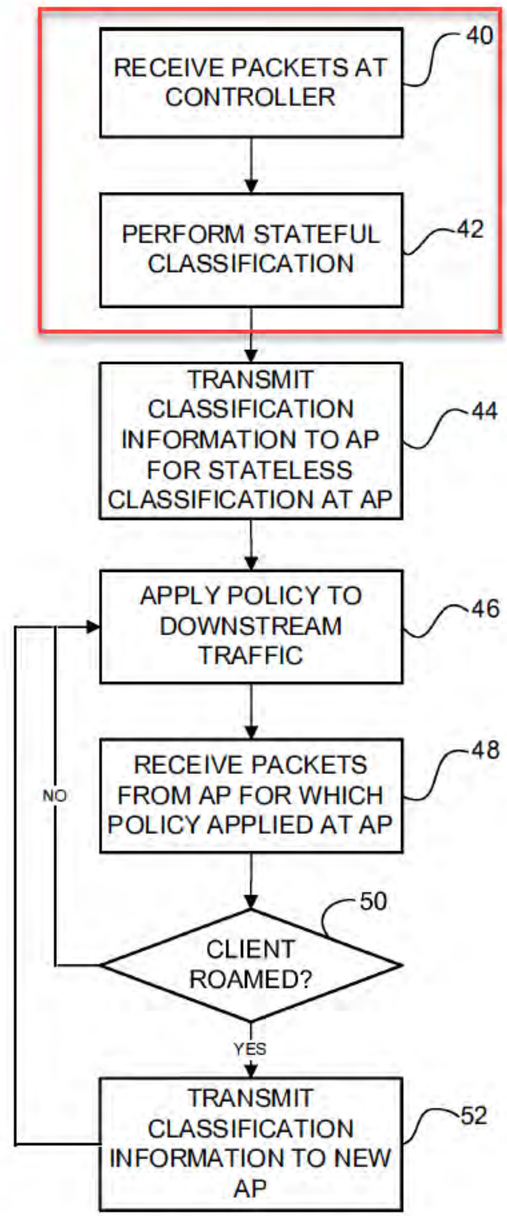
No.	’111 Patent Claim 8	Chandrasekaran
		Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0035]-[0044] (“WebEx Video: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x50 WebEx Voice: UDP Payload First byte=0x06 Bytes [6-9]=Data length

No.	’111 Patent Claim 8	Chandrasekaran
		10th byte=0x48”)

No.	’111 Patent Claim 9	Chandrasekaran
9	The method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller.	Chandrasekaran discloses the method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller. For example, Chandrasekaran discloses analyzing the packet through stateful classification by the controller. *See supra* at Claim 5. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to

No.	’111 Patent Claim 9	Chandrasekaran
		another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35,

No.	’111 Patent Claim 9	Chandrasekaran
		The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at Figure 3 (annotations added)

		RECEIVE PACKETS AT CONTROLLER 40 PERFORM STATEFUL CLASSIFICATION 42 TRANSMIT CLASSIFICATION INFORMATION TO AP FOR STATELESS CLASSIFICATION AT AP 44 APPLY POLICY TO DOWNSTREAM TRAFFIC 46 RECEIVE PACKETS FROM AP FOR WHICH POLICY APPLIED AT AP 48 NO CLIENT ROAMED? 50 YES TRANSMIT CLASSIFICATION INFORMATION TO NEW AP 52 FIGURE 3

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12	The method according to claim 9, wherein the analyzing comprises applying security or data analytic application.	Chandrasekaran discloses the method according to claim 9, wherein the analyzing comprises applying security or data analytic application. For example, Chandrasekaran discloses analyzing the packet by the controller through stateful classification where the classification is done in order to recognize the packet. A person of ordinary skill in the art would understand that stateful classification to recognize the packet is performed as a security and data analytic measure. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. *See supra* at Claim 9. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to

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		another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35,

No.	’111 Patent Claim 12	Chandrasekaran
		The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”)

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13	The method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality.	Chandrasekaran discloses the method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality. For example, Chandrasekaran discloses analyzing the packet by the controller through stateful classification where the classification is done in order to recognize the packet. A person of ordinary skill in the art would understand that stateful classification in order to recognize the packet may be performed by applying security application including a firewall or intrusion detection functionality. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 9. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful

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		classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”)

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		Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”)

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		Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 13 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses analysis by the intrusion detection engine on the monitoring appliance to detect communication intruders and suspicious activity. The monitoring appliance may also work in coordination with a firewall. Copeland at [0065] (“The intrusion detection engine 155 analyzes the flow data 160 to determine if the flow appears to be legitimate traffic or possible suspicious activity. Flows with suspicious activity are assigned a predetermined concern index (CI) value based upon a heuristically predetermined assessment of the significance of the threat of the particular traffic or flow or suspicious activity. The flow concern index values have been derived heuristically from extensive net-work traffic analysis. Concern index values are associated with particular hosts and stored in the host data structure 166 (FIG. 1). Exemplary concern index values for various exemplary flow-based events and other types of events are illustrated in connection with FIGS. 6 and 7.”) Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.”) Copeland at [0068] (“Those skilled in the art understand that many networks utilize firewalls to limit unwanted network traffic. A monitoring appliance 150 can be connected before a firewall to detect intrusions directed at the network. Con-versely, the monitoring appliance 150 may be installed behind a firewall to detect intrusions that bypass the firewall. Some systems install two firewalls with web and e-mails servers in the so-called "demilitarized zone" or "DMZ" between firewalls. One common placement of the

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		monitor-ing appliance 150 is in this demilitarized zone. Of course, those skilled in the art will appreciate that the flow-based intrusion detection system 155 or appliance 150 can operate without the existence of any firewalls.”) Copeland at [0069] (“It will now be appreciated that the disclosed meth-odology of intrusion detection is accomplished at least in part by analyzing communication flows to determine if such communications have the flow characteristics of probes or attacks. By analyzing communications for abnormal flow characteristics, attacks can be determined without the need for resource-intensive packet data analysis. A flow can be determined from the packets 101 that are transmitted between two hosts utilizing a single service. The addresses and port numbers of communications are easily discerned by analysis of the header information in a datagram.”) Copeland at [0112] (“FIG. 5 illustrates a logical software architecture of a flow-based intrusion detection engine 155 constructed in accordance with an embodiment of the present invention. As will be understood by those skilled in the art, the system is constructed utilizing Internet-enabled computer systems with computer programs designed to carry out the functions described herein. Preferably, the various computing func-tions are implemented as different but related processes known as "threads" which executed concurrently on modern day multi-threaded, multitasking computer systems.”) Copeland at Figure 5

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		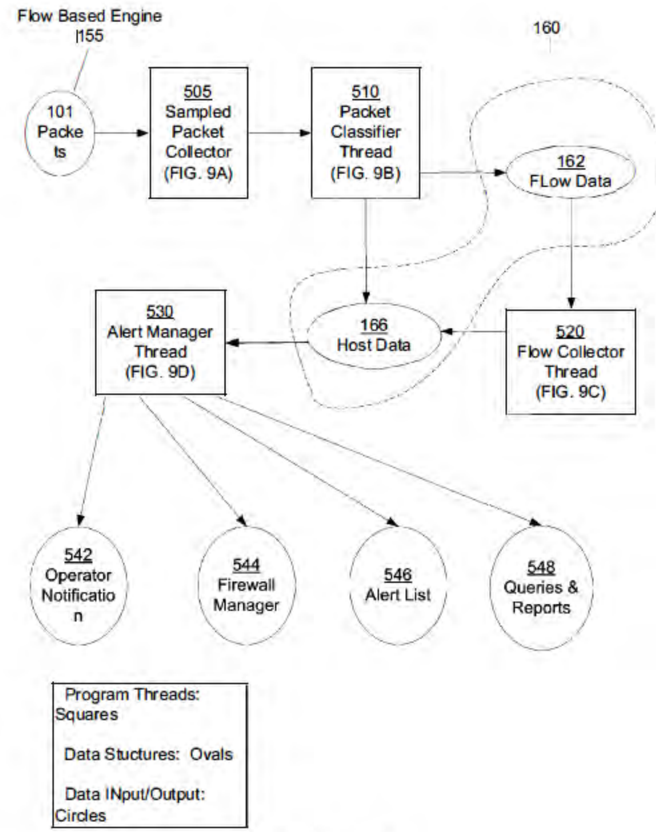 FIG. 5 Copeland at [0149] ("The alert manager 530 also looks for hosts whose CI or traffic (byte rate) exceeds preset alarm thresholds and which have not been handled on previous runs. The new alarm conditions can cause immediate operator notification by an operator notification process 542. These conditions can be highlighted on the user interface, and cause SNMP trap messages to be sent to a network monitor such as HP Openview, and/or email messages to the network adminis-trator that in turn may cause messages to be sent to beepers or cell phones. Messages can also be sent to cause automated devices such as a firewall manager 544 to drop packets going to or from an offending host. It will thus be

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		appreciated that the present invention advantageously operates in conjunc-tion with firewalls and other network security devices and processes to provide additional protection for an entity's computer network and computer resources.”) Copeland at [0177] (“If an alarm threshold has been exceeded, the "Yes" branch of step 975 is followed to step 976. In step 976, the alert manager thread generates certain predetermined signals designed to drawn the attention of a system administrator or other interested person. The alert manager 530 looks for hosts whose CI or traffic (byte rate) exceeds preset alarm thresholds and have not been handled on previous runs. The new alarm conditions can cause immediate operator notifi-cation. These conditions can be highlighted on the user interface, and cause SNMP trap messages to be sent to a network monitor such as HP Openview, and/or email mes-sages to the network administrator that in turn may cause messages to be sent to beepers or cell phones. Messages can also be sent to cause automated devices such as a firewall manager to drop packets going to or from an offending host. Step 976 is followed by step 972, in which the thread 530 awaits the requisite amount of time.”) For example, Chua ‘877 discloses security determinations and analysis that involve the use of firewalls or intrusion detection services. Chua ‘877 at 31:48-59 (“In some examples, SDN controller 112 further performs deep packet inspection (DPI) on packets from client device 102 (402). For example, SDN controller 112 may inspect one or more preliminary packets of packet flows originating from or directed to client device 102, and after determining that the packet flows are not malicious (after a predetermined number of packets), stop inspecting the packet flows. Alternatively, SDN controller 112 may program network devices of SDN 106 to forward a predetermined number of packets of the packet flows originating from or destined for client device 102 through a deep packet inspection service device, which may correspond to one of service devices 116.”) Chua ‘877 at 25:32-52 (“In the example of FIG. 5, SDN controller 112 determines zones for packet flows through the network devices forming the SDN (304). The zones generally correspond to packet flows, that is, paths through the SDN followed by particular packets. SDN controller 112 may store data defining the zones in the data model discussed above.

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		The data defining the zones may specify entities (e.g., users, devices, or the like) that have access to each zone. Thus, SDN controller 112 may program network devices of the SDN such that entities that are not authorized to access a particular zone are prevented from accessing the zone. SDN controller 112 may specify a zone using packet header field values, such as a source port, a destination port, a source IP address, a destination IP address, a virtual local area network (VLAN) tag, multiprotocol label switching (MPLS) labels, a packet protocol, and/or an IP subnet. In some cases, SDN controller 112 may specify whether a corresponding packet flow for a zone is suspect or malicious and construct the zone such that packets of the packet flow are prevented from reaching an intended destination. As noted above, zones may be ordered based on priority values when overlap occurs.") Chua '877 at 25:53-65 ("Furthermore, SDN controller 112 determines trusted packet flows (306). For example, SDN controller 112 may determine that certain packet flows can be trusted based on security controls, and that other packet flows cannot be trusted based on the security controls. That is, SDN controller 112 may determine whether a packet flow can be trusted based on values of packet headers for the packet flows, e.g., values of headers at various layers of the OSI model (e.g., any or all of layers 2-7 of the OSI model). In some examples, SDN controller 112 may omit any or all of steps 302, 304, and 306, e.g., omitting any or all of determination of service devices, determination of zones, and/or determination of trusted packet flows.") Chua '877 at 5:50-6:5 ("SDN 106 generally serves to interconnect various endpoint devices, such as client device 102 and server device 104. In addition, SDN 106 may provide services to network traffic flowing between client device 102 and server device 104. Alternatively, SDN 106 may provide services to client device 102, without further directing traffic to server device 106. For example, administrator 114 may use SDN controller 112 to program network devices of SDN 106 to direct network traffic for client device 102 to one or more of service devices 116. Service devices 116 may include, for example, intrusion detection service (IDS) devices, intrusion prevention system (IPS) devices, web proxies, web servers, web-application firewalls and the like. In other examples, service devices 116 may, additionally or alternatively, include devices for provid-ing services such as, for example, denial of service (DoS) protection, distributed denial of service (DDoS) protection, traffic filtering, wide area network (WAN) acceleration, or other such services. Service devices

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		116 may also addition-ally or alternatively include malware detection devices, net-work anti-virus devices, network packet capture and analysis devices, honeypot devices, reflector net devices, tar pit devices, domain name service (DNS) and global DNS server devices, mail proxies, and anti-spam devices.”) Chua ‘877 at 6:6-24 (“Service devices 116 may, additionally or alternatively, include devices in various device categories such as, for example, network and application security devices, application optimization devices, scaling devices, traffic shaping devices, and/or monitoring and analytics devices. Moreover, although shown as individual devices, it should be understood that service devices may be realized by physical devices, multi-tenant devices, or using virtual services (e.g., cloud-based services). Moreover, service devices 116 may represent multi-function devices. For purposes of example and ease of explanation, this disclosure primarily describes individual service devices. However, it should be understood that the techniques of this disclosure may be readily applied to virtual devices and cloud-based applications, in addition or in the alternative to physical devices. Likewise, where this disclosure refers to a switch or other network device, it should be understood that these techniques may apply to virtual switches or other virtual network devices.”) Chua ‘877 at 7:3-13 (“Devices that may be plugged into (that is, communicatively coupled to) SDN controller 112 (also sometimes referred to as a "FlowDirector") generally include classes of devices found in most network-based DMZs, including firewalls, web proxies, mail proxies, AV (anti-virus) proxies, mail systems, IDS (intrusion detection systems), IPS (intrusion prevention systems), VPN (virtual private network) servers, web application firewalls, vulnerability scanners, network recording and analysis systems, and packet shapers. Most of these devices are either security devices, or traffic engineering or visibility devices, in some examples.”) Chua ‘877 at 14:32-51 (“One example use case for SDN controller 112 includes performing internal security zone partitioning. In today's enterprise environment, certain flows can be trusted, based on security controls placed on the end points, while others must be assumed to have some potential for risk. SDN controller 112 may create security zones based both on physical topol-ogy as well as threat assessments based on L2-L4 header information. Business-level security rules can be implemented directly on SDN controller 112 to direct only higher risk flows through specific L4-L 7 devices (e.g., service devices 116) to

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		monitor for or block malicious traffic. That is, when an SDN interconnects a set of enterprise network devices of a common enterprise network and also provides connections for the enterprise network devices outside of the enterprise network, SDN controller 112 may determine that connections between the enterprise network devices within the enterprise network can be trusted, whereas connections to network devices outside the enterprise network cannot be trusted and, therefore, should be monitored by a security device.”) Chua ‘877 at 14:52-63 (“Thus, SDN controller 112 may determine separate sets of packet flows based on security controls, e.g., a first set of packet flows that can be trusted and a second set of packet flows that are not trusted. Then, SDN controller 112 may determine a first set of one or more paths for the first set of packet flows that omit a security device for the first set of packet flows (that is, based on the determination that the first set of packet flows can be trusted), and a second set of one or more paths for the second set of packet flows that direct the second set of packet flows through the security device (based on the determination that the second set of packet flows are not trusted).”) Chua ‘877 at 14:64-15:3 (“The security controls may include various types of information. For example, the security controls may specify values for one or more packet headers at various layers of the Open Systems Interconnection (OSI) network model. The security controls may specify information for any or all of network layers two, three, four, five, six, and/or seven of the OSI model.”) Chua ‘877 at 16:23-44 (“More particularly, control unit 130 may configure any of service devices 116 to send data representative of a particular event to SDN controller 112, and control unit 130 may auto-matically reprogram one or more network devices of SDN 106 in response to such data. For example, security monitor-ing applications of service devices 116 may determine that a specific source port, destination port, source IP address, des-tination IP address, or the like should be acted upon. Alter-natively, security monitoring applications may determine that, due to content or deep packet inspection, a specific type of traffic is malicious and should be blocked. In either case, the corresponding one of service devices 116 may send a message to SDN controller 112 representative of these deter-minations. As yet another example, a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN

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		controller 112 based on these metrics. SDN controller 112 may respond by programming network devices of SDN 106 to perform a programmed action, such as allowing corresponding traffic, blocking corresponding traf-fic, mirroring corresponding traffic, redirecting correspond-ing traffic.”) Chua ‘877 at 19:60-20:4 (“FIG. 3 is a conceptual diagram illustrating an example 60 system 200 including various devices that may be used in accordance with the techniques of this disclosure. In this example, system 200 includes various network devices, including firewall 206, router 208, switch 210, web proxy 212, intrusion detection system (IDS) 214, web server 216, 65 administrator ("admin") workstation 220, and software defined network (SDN) controller 218. Web clients 202 can access system 200 via a network, such as the Internet, e.g., Internet 204. Internet 204 may include additional network devices not explicitly shown in FIG. 3, such as routers, switches, hubs, gateways, security devices, or the like.”)

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14	The method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet.	Chandrasekaran discloses the method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet. For example, Chandrasekaran discloses the controller performing Deep Packet Inspection, which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined. *See supra* at Claim 9. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may

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		serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.") Chandrasekaran at [0016] ("The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.") Chandrasekaran at [0020] ("In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.") Chandrasekaran at [0021] ("Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain

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		requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful

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		classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”)

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15[a]	The method according to claim 9, wherein the packet comprises distinct header and payload fields, and	Chandrasekaran discloses the method according to claim 9, wherein the packet comprises distinct header and payload fields. For example, Chandrasekaran discloses packets with header and payload fields. *See supra* at Claim 9. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at

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		a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol),

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		application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.") Chandrasekaran at [0026] ("Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.") Chandrasekaran at [0031] ("FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).") Chandrasekaran at [0033] ("The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI

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		rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at [0035]-[0044] (“WebEx Video: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x50 WebEx Voice: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x48”)
15[b]	wherein the analyzing comprises checking part of, or whole of, the payload field.	Chandrasekaran discloses wherein the analyzing comprises checking part of, or whole of, the payload field. For example, Chandrasekaran discloses analyzing, including by deep packet inspection, by to looking into the packet past basic header information so that the contents, or payload, of a particular packet can be determined. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and

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		may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”)

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		Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12

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		sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at [0035]-[0044] (“WebEx Video: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x50 WebEx Voice: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x48”)

No.	’111 Patent Claim 16	Chandrasekaran
16[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Chandrasekaran discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
16[b]	the header comprises one or more flag bits, and	Chandrasekaran discloses the header comprises one or more flag bits. For example, Chandrasekaran discloses packets with header fields. A person of ordinary skill in the art would understand that the header could be comprised of one or more flag bits. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this

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		limitation, the header comprises one or more flag bits would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may

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		include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification

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		information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at [0035]-[0044] (“WebEx Video: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x50 WebEx Voice: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x48”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the

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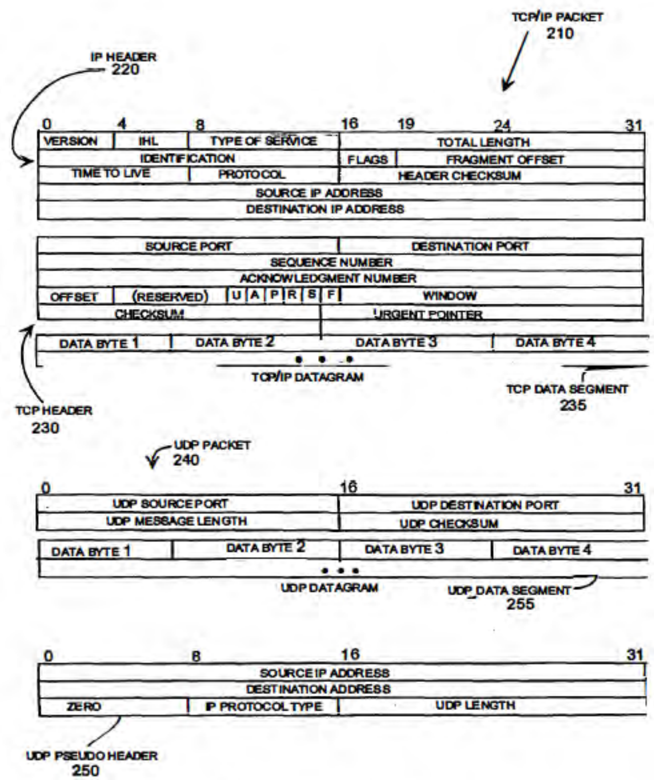
		art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet headers with flag bits. Copeland at Figure 2  PACKET HEADERS **FIG. 2**

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		Copeland at [0076] (“FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.”) Copeland at [0077] (“The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.”) Copeland at [0078] (“In regards to a typical IP packet 210, the first 4 bits of the IP header 220 identify the Internet protocol (IP) version. The following 4 bits identify the IP header length in 32 bit words. The next 8 bits differentiate the type of service by describing how the packet should be handled in transit. The following 16 bits convey the total packet length.”) Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all

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		buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0083] (“Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.”) Copeland at [0116] (“These steps generally require manipulations of quantities such as IP addresses, packet length, header length, start times, end times, port numbers, and other packet related information. Usually, though not necessarily, these quanti-ties take the form of electrical, magnetic, or optical signals capable of being stored, transferred, combined, compared, or otherwise manipulated. It is conventional for those skilled in the art to refer to these signals as bits, bytes, words, values, elements, symbols, characters, terms, numbers, points, records, objects, images, files or the like. It should be kept in mind, however, that these and similar terms should be associated with appropriate quantities for computer opera-tions and that these terms are merely conventional labels applied to quantities that exist within and during operation of the computer.”) As another example, Kempf discloses packet headers with flag bits. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags

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		field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E

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		flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31,

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		indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”)
		
		Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_
		teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenFlow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		struct ermst_gtp_mask {
		uint32_t gtp_wildcard;
		uint16_t gtp_flag_mask;
		};
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

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16[c]	wherein the packet-applicable criterion is that one or more of the flag bits is set.	Chandrasekaran discloses wherein the packet-applicable criterion is that one or more of the flag bits is set. For example, Chandrasekaran discloses packets with header fields. A person of ordinary skill in the art would understand that the header could be comprised of one or more flag bits. A person of ordinary skill in the art would further understand that such flag bits in packet headers could be the packet specific information. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the packet applicable criterion is that one or more of the flag bits is set would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the

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		mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.") Chandrasekaran at [0020] ("In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.") Chandrasekaran at [0021] ("Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.") Chandrasekaran at [0023] ("In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.") Chandrasekaran at [0026] ("Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and

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		use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at [0035]-[0044] (“WebEx Video: UDP Payload First byte=0x06 Bytes [6-9]=Data length

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		10th byte=0x50 WebEx Voice: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x48") Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[c] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet specific characteristics including flag bits that are set. Copeland at [0081] ("In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.") Copeland at [0082] ("Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP

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		buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0083] (“Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”) Copeland at [0125] (“For purposes of the description, which follows, the IP address with the lower value, when considered as a 32-bit unsigned integer, is designated ip[0] and the corresponding port number is designated pt[0]. The higher IP address is designated ip[l] and the corresponding TCP or UDP port number is designated pt[l]. At some point, either pt[0] or pt[l] may be designated the "server" port by setting an appropriate bit in a bit map that is part of the flow record (record "state", bit 1 or 2 is set).”) Copeland at [0145] (“A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.”) As another example, Kempf flow table matches in which the flag bits is set.

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		Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the

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		cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo

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		Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”) Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenF!ow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:

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```
struct ermst_gtp_mask {
  uint32_t gtp_wildcard;
  uint16_t gtp_flag_mask;
};
```

Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

Kempf at Figure 10

	Bits							
Octets	8	7	6	5	4	3	2	1
1	Version			PT	(*)	E	S	PN
2	Message Type							
3	Length (1st Octet)							
4	Length (2nd Octet)							
5	Tunnel Endpoint Identifier (1st Octet)							
6	Tunnel Endpoint Identifier (2nd Octet)							
7	Tunnel Endpoint Identifier (3rd Octet)							
8	Tunnel Endpoint Identifier (4th Octet)							
9	Sequence Number (1st Octet)							
10	Sequence Number (2nd Octet)							
11	N-PDU Number							
12	Next Extension Header Type							

NOTE 0: (*) This bit is a spare bit. It shall be sent as '0'. The receiver shl not evaluate this bit,
NOTE 1: 1) This field shall only be evaluated when indicated by the S flag set to 1.
NOTE 2: 2) This field shall only be evaluated when indicated by the PN flag set to 1.
NOTE 3: 3) This field shall only be evaluated when indicated by the E flag set to 1.
NOTE 4: 4) This field shall be present if and only if any one or more of the S. PN and E flags are set.

FIG. 10

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17[a]	The method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet, and	Chandrasekaran discloses the method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet. For example, Chandrasekaran discloses data traffic comprised of packets that may be a Transmission Control Protocol packet. A person of ordinary skill in the art would understand that the packets may be part of a number of protocols, including Transmission Control Protocol. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the packet is an Transmission Control Protocol (TCP) packet would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 16. Chandrasekaran at [0012] ("Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches,

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		gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0017] (“The stateful classifier 18 at the controller 12 classi-fies traffic based on multiple packets received from the begin-ning of a flow. Stateful classification uses rules which need information on states for a previous packet (or packets) in a flow. Stateful classification may be based, for example, on packet pattern matching and decoding of protocols and their states. Stateful classification is also referred to as flow clas-sification since it looks at a data stream of related packets (flow, session).”) Chandrasekaran at [0018] (“The stateless classifier 22 at the AP 14 uses rules that can act on a per packet basis in the flow. Stateless classifica-tion (also referred to as packet classification) is based on individual packet inspection (e.g., 5 tuple, pattern matching) without knowledge of any related stream of packets, flows, sessions, or protocols.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 17(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses TCP packets. Copeland at Figure 2

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		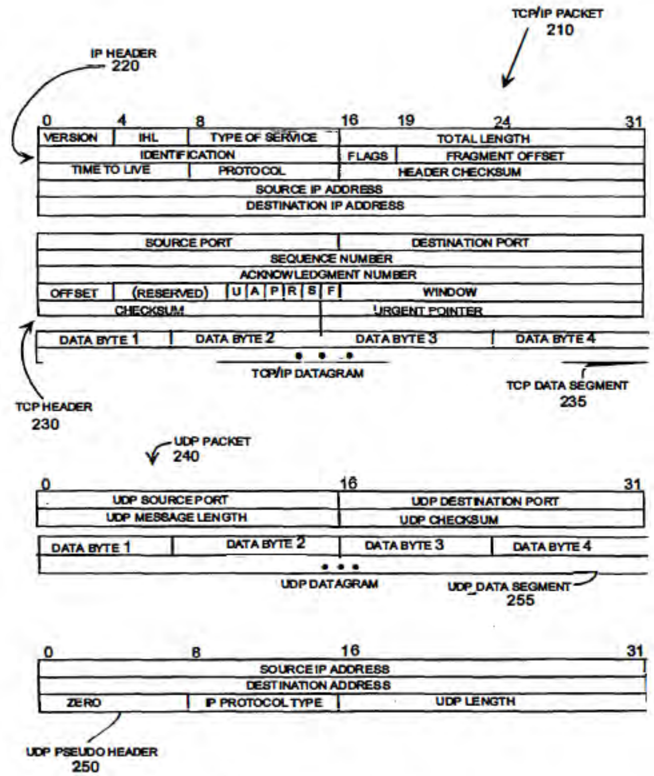 PACKET HEADERS FIG. 2 Copeland at [0076] (“FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.”)

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		Copeland at [0077] ("The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.") For example, Chua discloses packet traffic using TCP services. Chua at 18:8-44 ("Based on the rule set for a specific device, including what traffic is allowed through, from what zones and expected targets, administrator 114 can infer the right type of test traffic that should be injected for both positive and negative testing of the device. Similarly, the inference can be made to deter-mine the appropriate type of flow troubleshooting that includes the appropriate IP ranges to watch on, and the TCP/ UDP services that the flowchain is meant to service. In the case of traffic injection to test a path through SDN 106, path verification unit 136 of SDN controller 112 may perform any of the following tasks: Infer from the flowchain the appropriate type of transmission control protocol (TCP) or uniform datagram proto-col (UDP) services that are relevant to the chain, as well as the range of source and target IP addresses for this chain Create either UDP packet flows or TCP sessions that confirm to the traffic type inferred or discovered form the flowchain configuration Using an SDN device (e.g., a switch of SDN 106), inject these flows or TCP sessions by temporarily inserting a rule into the rules table on the switch that will take the flows from SDN controller 112 and send them across the devices of SDN 106 (starting from the ingress device in the chain) Using an SDN device, insert flow rules to replicate (flow-span) these same traffic streams at each point in the flow chain. The replicated traffic may be directed (via SDN rules) to a collection device (or to SDN controller 112) that can determine whether the test packets passed through each port on the switch that is part of the flowchain

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		On the final exit device (prior to the end target), insert a flow rule that will drain all injected packets so the final devices (that is, devices external to SDN 106) do not see any of the test traffic.”)
17[b]	wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof.	Chandrasekaran discloses wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. For example, Chandrasekaran discloses packets with header fields. A person of ordinary skill in the art would understand that the header could be comprised of one or more flag bits that comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”)

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		Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with

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		a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or

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		rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”) Chandrasekaran at [0035]-[0044] (“WebEx Video: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x50 WebEx Voice: UDP Payload First byte=0x06 Bytes [6-9]=Data length 10th byte=0x48”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 17[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses TCP packets with flag bits including SYN, ACK, FIN, and R flag bits. Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U

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		flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”) Copeland at [0090] (“Host2 responds with a SYN-ACK packet. In this message, both the SYN flag and the ACK flag are set. Host2 provides the initial sequence number for its data to Hostl. Host2 also sends to Hostl the acknowledgment number that is the next sequence number Host2 expects to receive from host 1. In the SYN-ACK packet sent by Host2, the acknowl-edgment number is the initial sequence number of Hostl plus 1, which should be the next sequence number received.”) Copeland at [0091] (“Hostl responds to the SYN-ACK with a packet with just the ACK flag set. Hostl acknowledges that the next packet of information received from Host2 will be Host2's initial sequence number plus 1. The three-way handshake is complete and data is transferred.”) Copeland at [0092] (“Host2 responds to ACK packet with its own ACK packet. Host2 acknowledges the data it has received from Hostl by sending an acknowledgment number one greater than its last received data sequence number. Both hosts send packets with the ACK flag set until the session is to end although the P and U flags may also be set, if warranted.”)

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		Copeland at [0093] (“As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.”) Copeland at [0094] (“Host2 acknowledges the FIN packet by sending its own ACK packet. The ACK packet has the acknowledge-ment number one greater than the sequence number of Hostl's FIN-ACK packet. ACK packets are still delivered between the two hosts, except that HOSTl's packets have no data appended to the TCP/IP end of the headers.”) Copeland at [0095] (“When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.”) Uchida discloses wherein the one or more flag bits comprises a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. As another example, Uchida discloses the TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag *i.e.*, the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit. Uchida at [0040] (“A flow end can be detected by various methods as below. For example, in one method, a protocol end message is checked. For example, in the TCP (Transmission Control Protocol), a FIN flag is checked. In this way, the end of communication, that is, the end of a flow using communica-tion, can be detected. In practice, after a FIN flag, communi-cation with an ACK packet is generated in a reverse-direction flow (a flow in which the source and the destination are reversed). Thus, by detecting the ACK flag in the reverse-direction flow after the FIN packet, a flow end can be deter-mined. Further, since the TCP is used in bidirectional com-munication, the forward- and reverse-direction flows can be used as a pair to determine a flow end. Namely, if the end of a flow is detected, a process rule corresponding to the reverse-direction flow of the flow can also be determined

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		to be unnec-essary. Alternatively, a communication end can also be deter-mined when a predetermined time elapses after reception of a SYN packet and a timeout is determined. Still alternatively, a communication end can be determined by reception of a RST packet. These methods will be described in more detail later as specific examples.”) Uchida at [0050] (“The flow end check unit can use at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag extracted by the end determination information extraction unit to determine a flow end.”) Uchida at [0055] (“In the process rule update method, a flow end can be determined by at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag.”) Uchida at [0102] (“Next, specific examples 1 to 3 will be described. In the examples 1 to 3, a flow end is determined by combining features of the above individual exemplary embodiments and using TCP (Transmission Control Protocol) flags.”) Uchida at [0103] (“FIG. 6 is a state transition diagram of TCP connec-tion. "CLOSED" at the top of FIG. 6 represents the end of TCP communication, and portions connected thereto repre-sent states prior to the end of TCP communication. Approxi-mately 2MSL (MSL: Maximum Segment Lifetime) is the maximum amount of time required to reach the above "CLOSED," that is, if the packet forwarding apparatus stands by for approximately 2MSL after both FINs flow, the above "CLOSED" is reached. Thus, after a FIN is confirmed in either direction, if this 2MSL elapses, basically, a communi-cation end can be determined. Even if the state does not change smoothly because of packet loss or the like (for example, even if an ACK packet does not arrive after "CLOS-ING"), a retransmitted packet is forwarded immediately after this 2MSL. Thus, the end of TCP communication can be determined if a new FIN packet is not received within the time corresponding to the 2MSL and a margin (2MSL+a) at long-est.”) Uchida at [0104] (“Hereinafter, the description will be made, assuming that a packet forwarding apparatus Cl according to the present invention relays TCP communication between a com-puter (client) Dl 0 and a server D20 that use network configu-rations illustrated in FIG. 7. In the example of FIG. 7, the computer Dl0 belongs to a network represented by 192.168. 0./24 and is set by 192.168.0.10. The server D20 belongs to a

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		network represented by 192.168.1./24 and is set by 192.168. 1.10. As in the case of the OpenFlow controller described in Non-Patent Documents 1 and 2, a control apparatus (control-ler) Dl is connected to the packet forwarding apparatus Cl via a dedicated channel and manages connection between the two networks. In the following description, the control appa-ratus (controller) Dl controls the packet forwarding appara-tus Cl so that connection from other networks appears as communication from network number 1 (192.168.1.1) of the respective networks (see process rule actions in FIG. 19). In addition, in the present specific example, since FIN packets are monitored, the end determination information extraction unit Cl 7 monitors a protocol stack, including: fields in which the TCP is determined; and the FIN flag in the TCP header.”) Uchida at [0105] (“FIG. 8 is a flow chart of a flow end determination process using FIN flags. In FIG. 8, steps relating to a timeout determination are added to steps Slll to S116 in the flow chart in FIG. 3. Thus, the flow chart in FIG. 8 includes more detailed steps than the flow chart of FIG. 3. Hereinafter, operations will be described with reference to FIGS. 3, 6, and 8 and FIGS. 9 to 13. In practice, prior to TCP/IP communi-cation, ARP (Address Resolution Protocol) communication is executed, and a process rule may be set in that stage. However, for ease of description, description of the ARP communication will be omitted. The following description will be made based on communication at the TCP/IP level.”) Uchida at [0106] (“First, the computer Dl0 starts communication with the server D20. For an initial establishment of communica-tion, a packet (SYN) is inputted to the packet forwarding apparatus Cl (start of ACTIVE OPEN through SYN forward-ing in FIG. 6). The packet reception unit Cl0 receives and stores this first packet in the packet storage unit Cll (steps SlOl to S102 in FIG. 3).”) Uchida at [0107] (“The packet reception unit C10 notifies the packet process information extraction unit C12 and the end determination information extraction unit C17 of reception of the packet. The packet process information extraction unit C12 refers to the packet storage unit C11 and extracts information such as IP source and destination information that is necessary to search for a process rule (step S103 in FIG. 3). Hereinafter, a process corresponding to steps S103 to S110 in FIG. 3 will be executed.”)

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		Uchida at [0115] ("Upon receiving a notification that the packet has been received by the packet reception unit Cl 0, the end deter-mination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN flag (step S201 in FIG. 8).") Uchida at [0116] ("Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 1; the source address is 192.168. 0.10; the destination is 192.168.1.10; and the protocol is TCP (the type is Ox0006)) and stands by until forwarding of the packet. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a process rule to be deleted from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule to be deleted represents that the source address is 192.168.1.1; the destination is 192.168.1.1 0; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).") Uchida at [0117] ("Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203). These steps correspond to steps Slll to S114 in FIG. 3.") Uchida at [0121] ("Next, after an ACK reply in response to the FIN packet from the computer DlO is forwarded from the server D20 in the same way as the above normal packet (start of PASSIVE CLOSE in FIG. 6), the server D20 transmits a FIN packet to the computer DlO. When this FIN packet is inputted to the packet forwarding apparatus Cl, the flow end determi-nation process from steps Slll to S116 is started, as in the case of the above start of ACTIVE CLOSE.") Uchida at [0122] ("Upon receiving a notification that the packet has been received from the packet reception unit Cl0, the end determination information extraction unit Cl 7 refers to

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		the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN packet (step S201 in FIG. 8).") Uchida at [0123] ("Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a modified process rule represents that the source address is 192.168.1. 10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extrac-tion unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).") Uchida at [0124] ("Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203 in FIG. 8). These steps correspond to steps Slll to S114 in FIG. 3.") Uchida at [0125] ("At this point, since a FIN packet has been transmit-ted, the flow end check unit C18 uses the information for identifying a process rule to be deleted as a key, extracts the process rule (process rule corresponding to ingress port 2 in FIG. 11) from the process rule storage unit C13, and marks a FIN packet reception flag (steps S204 to S205 in FIG. 8). This process corresponds to the internal state update process in step S115 in FIG. 3.") Uchida at [0134] ("Referring back to the state transition diagram of TCP connection in FIG. 6, there are two cases where "CLOSED" at the top of FIG. 6 is reached without a state transition involving FIN flags. One case arises when the ses-sion is closed from SYN_SENT, which is reached when a SYN packet in which a SYN flag is marked is

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		transmitted. The other case arises when a timeout is generated. In such case, while the packet forwarding apparatus cannot monitor the closed session, the packet forwarding apparatus can con-firm a timeout in the following way. In the present specific example, a flow end is determined by this timeout.") Uchida at [0135] ("n the present specific example, if a SYN/ ACK packet does not flow in a direction opposite to the SYN packet flow direction within a predetermined time (from "SYN_ RCVD" to "SYN_SENT" in FIG. 6), a timeout is determined.") Uchida at [0136] ("FIG. 14 is a flow chart illustrating a flow end deter-mination process using a SYN flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the dif-ference.") Uchida at [0137] ("In FIG. 14, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage, unit Cll, monitors a TCP SYN flag, and finds a SYN packet (step S301 in FIG. 14).") Uchida at [0138] ("Since a SYN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule repre-sents that the source address is 192.168.1.10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the SYN packet has been received and these items of information (step S302 in FIG. 14).")

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		Uchida at [0139] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether a SYN flag is set in a prede-termined packet header position and an ACK flag is not marked (step S303 in FIG. 14). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0148] (“ Next, a third specific example in which a flow end determination is executed by using a TCP RST (reset) flag will be described.”) Uchida at [0149] (“Referring back to the state transition diagram of TCP connection in FIG. 6, there is a transition from "SYN_ RCVD," which is a communication establishment standby state, to "LISTEN," which is a communication standby state. A TCP RST (reset) flag signifies release of connection and retry of communication. Namely, since a RST packet in which this RST flag is set signifies invalidation of communi-cation, by detecting this RST flag, a flow end can be deter-mined.”) Uchida at [0150] (“FIG. 16 is a first flow chart illustrating a flow end determination process using a RST flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the difference.”) Uchida at [0151] (“In FIG. 16, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP RST flag, and finds a RST packet (step S401 in FIG. 16).”) Uchida at [0152] (“Since a RST flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the RST packet has been received and these items of information (step S402 in FIG. 16).”)

No.	’111 Patent Claim 17	Chandrasekaran
		Uchida at [0164] (“For example, in a specific example of the present invention, certain TCP flags are monitored. A single packet forwarding apparatus can monitor these flags in a parallel fashion. For example, after a packet that triggers a flow end is detected, the above process may be allowed to branch to the above FIGS. 8, 14, and 16 (17) to realize parallel monitoring.”)

No.	’111 Patent Claim 18	Chandrasekaran
18[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Chandrasekaran discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
18[b]	the header comprises at least the first and second entities addresses in the packet network, and	Chandrasekaran discloses the header comprises at least the first and second entities addresses in the packet network. For example, Chandrasekaran discloses packet headers that may include source and destination addresses. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at

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		a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”) Chandrasekaran at [0021] (“Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol),

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		application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Chandrasekaran at [0026] (“Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI

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		rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”)
18[c]	wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses.	Chandrasekaran discloses wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses. For example, Chandrasekaran discloses the classification information, including source and destination addresses and other tuple information. Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of

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		the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.") Chandrasekaran at [0020] ("In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.") Chandrasekaran at [0021] ("Once the application is recognized, QoS or other policies associated with the application can be applied to traffic so that the network can invoke services for that par-ticular application. For example, the application may have certain requirements and expectations from the network infrastructure, which may be specified in terms of bandwidth, delay, jitter, throughput, packet loss, or other performance attributes.") Chandrasekaran at [0023] ("In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.") Chandrasekaran at [0026] ("Memory 34 may be a volatile memory or non-vola-tile storage, which stores various applications, operating sys-tems, modules, and data for execution and use by the proces-sor 32. Memory 34 may include, for example, classification database 35. The classification database 35 may be any data structure configured for at least temporarily

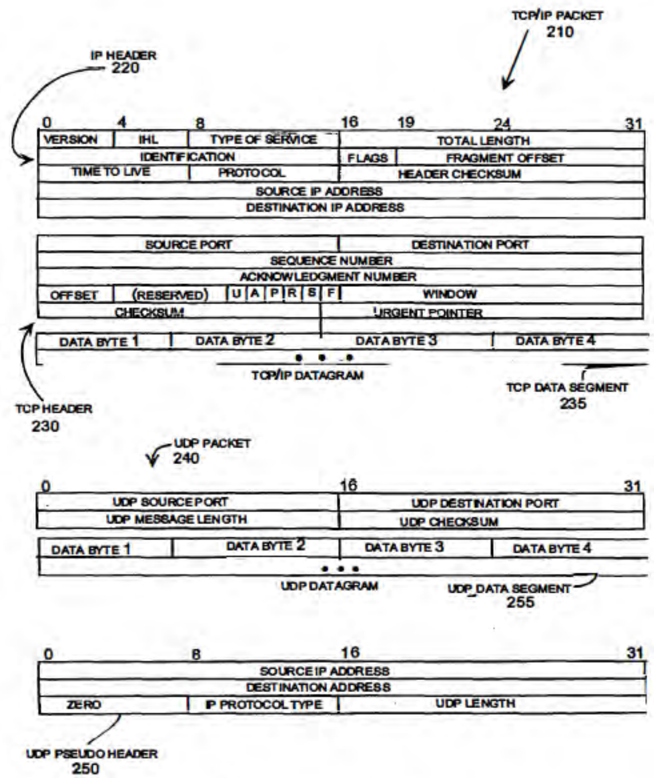
No.	’111 Patent Claim 18	Chandrasekaran
		storing classifi-cation information including, for example, flow information, application ID, stateless DPI rules, and policies.”) Chandrasekaran at [0031] (“FIG. 3 is a flowchart illustrating an example of a process at the controller 12 for classification of traffic for application aware policies in a wireless network, in accor-dance with one embodiment. At step 40, the controller 12 receives packets belonging to a network flow. The controller 12 performs stateful classification to identify an application associated with the flow (step 42). The controller 12 transmits classification information (e.g., flow information, stateless DPI rule, and policy) to the AP 14 for use in stateless classi-fication at the AP (step 44). The controller 12 applies policies to downstream traffic (received at the controller and destined for the client 16) (step 46) and receives upstream traffic for which policies have been applied at the AP 14 (step 48). If the controller 12 determines (e.g., receives an indication) that the client 16 has roamed, it transmits the classification informa-tion to the new AP 14 to which the client has roamed (steps 50 and 52).”) Chandrasekaran at [0033] (“The following describes an example of the above process for WebEx traffic that has different sub-classifications for voice and video traffic. Stateful classification is first performed by the controller 12 at the beginning of the flow. The controller 12 may need to process, for example, 10, 100, or any other number of packets to classify the flow as Web Ex traffic. Once the classification is performed, the controller 12 sends the stateless DPI rules and flow information to the AP 14 for stateless sub-classification to distinguish voice, video, or data within a WebEx flow. For example, after the controller 12 identifies the WebEx meeting traffic, it pushes the tuple, the stateless DPI rules (as shown below), and policies to the AP 14 for upstream traffic marking, dropping, or rate-limit-ing. If the client 16 roams, the controller 12 transmits the same classification information to the new AP to which the client has roamed.”)

No.	’111 Patent Claim 19	Chandrasekaran
19	The method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses.	Chandrasekaran discloses the method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses. For example, Chandrasekaran discloses source and destination IP addresses. *See supra* at Claim 18. Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0017] (“The stateful classifier 18 at the controller 12 classi-fies traffic based on multiple packets received from the begin-ning of a flow. Stateful classification uses rules which need information on states for a previous packet (or packets) in a flow. Stateful classification may be based, for example, on packet pattern matching and decoding of protocols and their states. Stateful classification is also referred to as flow clas-sification since it looks at a data stream of related packets (flow, session).”) Chandrasekaran at [0018] (“The stateless classifier 22 at the AP 14 uses rules that can act on a per packet basis in the flow. Stateless classifica-tion (also referred to as packet

No.	’111 Patent Claim 19	Chandrasekaran
		classification) is based on individual packet inspection (e.g., 5 tuple, pattern matching) without knowledge of any related stream of packets, flows, sessions, or protocols.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”)

No.	’111 Patent Claim 20	Chandrasekaran
20[a]	The method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields, and	Chandrasekaran discloses the method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields. *See supra* at Claim 1, 17[a].
20[b]	wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a	Chandrasekaran discloses wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values. For example, Chandrasekaran discloses classification information that can include different identifiers of a packet. A person of ordinary skill in the art would understand that the classification information transmitted could be the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, which are applied to policy rules. Thus, at least under the apparent claim scope alleged by Orckit’s

No.	’111 Patent Claim 20	Chandrasekaran
	predetermined value or values.	Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values would have been obvious to a person having ordinary skill in the art, as explained below. Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 17(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses TCP packets with TCP port information. Copeland at Figure 2

No.	’111 Patent Claim 20	Chandrasekaran
		 PACKET HEADERS FIG. 2 Copeland at [0076] (“FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.”)

No.	'111 Patent Claim 20	Chandrasekaran
		Copeland at [0077] ("The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.") For example, Chua discloses packet traffic using TCP services with TCP port information. Chua at 18:8-44 ("Based on the rule set for a specific device, including what traffic is allowed through, from what zones and expected targets, administrator 114 can infer the right type of test traffic that should be injected for both positive and negative testing of the device. Similarly, the inference can be made to deter-mine the appropriate type of flow troubleshooting that includes the appropriate IP ranges to watch on, and the TCP/ UDP services that the flowchain is meant to service. In the case of traffic injection to test a path through SDN 106, path verification unit 136 of SDN controller 112 may perform any of the following tasks: Infer from the flowchain the appropriate type of transmission control protocol (TCP) or uniform datagram proto-col (UDP) services that are relevant to the chain, as well as the range of source and target IP addresses for this chain Create either UDP packet flows or TCP sessions that confirm to the traffic type inferred or discovered form the flowchain configuration Using an SDN device (e.g., a switch of SDN 106), inject these flows or TCP sessions by temporarily inserting a rule into the rules table on the switch that will take the flows from SDN controller 112 and send them across the devices of SDN 106 (starting from the ingress device in the chain) Using an SDN device, insert flow rules to replicate (flow-span) these same traffic streams at each point in the flow chain. The replicated traffic may be directed (via SDN rules) to a collection device (or to SDN controller 112) that can determine whether the test packets passed through each port on the switch that is part of the flowchain

No.	’111 Patent Claim 20	Chandrasekaran
		On the final exit device (prior to the end target), insert a flow rule that will drain all injected packets so the final devices (that is, devices external to SDN 106) do not see any of the test traffic.”)

No.	’111 Patent Claim 21	Chandrasekaran
21	The method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network.	Chandrasekaran discloses the method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network. For example, Chandrasekaran discloses a packet network comprising a Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof . *See supra* at Claim 1. Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches,

No.	’111 Patent Claim 21	Chandrasekaran
		gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”)

No.	’111 Patent Claim 22	Chandrasekaran
22	The method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device..	Chandrasekaran discloses the method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device. For example, Chandrasekaran discloses mobile devices that may be a client, wireless device, endpoint, host, user device, etc, that employ client/server applications. A person of ordinary skill in the art would understand that a first mobile device may be either a server device or client device and a second mobile may be either a server device or client device. *See supra* at Claim 1.

No.	’111 Patent Claim 22	Chandrasekaran
		Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and

No.	’111 Patent Claim 22	Chandrasekaran
		may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0015] (“The mobile device 16 may be any suitable equip-ment that supports wireless communication, including for example, a mobile phone, personal digital assistant, portable computing device, laptop, tablet, multimedia device, or any other wireless device. The mobile device 16 and access point 14 are configured to perform wireless communication according to a wireless network communication protocol such as IEEE 802.11/Wi-Fi.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”)

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No.	’111 Patent Claim 23	Chandrasekaran
23[a]	The method according to claim 22, wherein the server device comprises a web server, and	Chandrasekaran discloses the method according to claim 22, wherein the server device comprises a web server. For example, Chandrasekaran discloses a mobile device that may be a server device, further comprising a web device. A person of ordinary skill in the art would understand that a mobile device that may be a server device, may further comprise a web device. *See supra* at Claim 22. Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”)

No.	’111 Patent Claim 23	Chandrasekaran
		Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at [0015] (“The mobile device 16 may be any suitable equip-ment that supports wireless communication, including for example, a mobile phone, personal digital assistant, portable computing device, laptop, tablet, multimedia device, or any other wireless device. The mobile device 16 and access point 14 are configured to perform wireless communication according to a wireless network communication protocol such as IEEE 802.11/Wi-Fi.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes)

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		clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.") Chandrasekaran at [0020] ("In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.")
23[b]	wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device.	Chandrasekaran discloses wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device. For example, Chandrasekaran discloses a mobile device that may be a client device, wireless device, or endpoint, which may be any of a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device Chandrasekaran at [0012] ("Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN

No.	’111 Patent Claim 23	Chandrasekaran
		(wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”)

No.	’111 Patent Claim 23	Chandrasekaran
		Chandrasekaran at [0015] (“The mobile device 16 may be any suitable equip-ment that supports wireless communication, including for example, a mobile phone, personal digital assistant, portable computing device, laptop, tablet, multimedia device, or any other wireless device. The mobile device 16 and access point 14 are configured to perform wireless communication according to a wireless network communication protocol such as IEEE 802.11/Wi-Fi.”) Chandrasekaran at [0016] (“The wireless controller 12 includes a stateful appli-cation classifier 18 and the AP 14 includes a stateless appli-cation classifier 22. After the stateful classifier 18 identifies the application, the controller 12 transmits (e.g., pushes) clas-sification information 26 to the AP 14 so that the AP can perform stateless classification and apply policies (e.g., QoS or other policies) to traffic received from the mobile device 16. The controller 12 may also provide the classification information 26 to another AP 14 if the client 16 roams to a new AP, as shown in FIG. 1. Implementation of the stateful classifier 18 at the controller 12 and stateless classifier 22 at the AP 14 allows for policies to be applied for downstream traffic (packet 25) at the wireless controller 12, and for upstream traffic (packet 28) at the access point 14.”) Chandrasekaran at [0020] (“In one embodiment, the stateful classifier 18 is a classification engine configured for NBAR (Network Based Application Recognition) or other technology used to classify applications. The classifier 18 is operable to recognize a wide variety of applications, including Web-based and client/ server applications. The applications may include, for example, Skype, YouTube, Netflix, WebEx, Google Voice, BitTorrent, Citrix, virtual desktop, PCoIP, or any other appli-cation. The classification engine may be configured, for example, to identify generic protocols and perform heuristic analysis for encrypted protocols. The classifiers 18, 22 are configured to perform deep packet inspection (DPI), which provides the ability to look into the packet past basic header information so that the contents of a particular packet can be determined.”)

No.	’111 Patent Claim 24	Chandrasekaran
24	The method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol.	Chandrasekaran discloses the method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol. For example, Chandrasekaran discloses a wireless network where communication between the controller and access point is based on Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual private network, or any other network or combination thereof, or any other standard protocol. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the communication between the network node and the controller is based on, or uses, a standard protocol would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 22. Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”)

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		Chandrasekaran at [0017] (“The stateful classifier 18 at the controller 12 classi-fies traffic based on multiple packets received from the begin-ning of a flow. Stateful classification uses rules which need information on states for a previous packet (or packets) in a flow. Stateful classification may be based, for example, on packet pattern matching and decoding of protocols and their states. Stateful classification is also referred to as flow clas-sification since it looks at a data stream of related packets (flow, session).”) Chandrasekaran at [0018] (“The stateless classifier 22 at the AP 14 uses rules that can act on a per packet basis in the flow. Stateless classifica-tion (also referred to as packet classification) is based on individual packet inspection (e.g., 5 tuple, pattern matching) without knowledge of any related stream of packets, flows, sessions, or protocols.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 24 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses a packet network using the OpenFlow protocol, which is used in Software Defined Networks for communication between network device and a controller. Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect

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		to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.”) Kempf at [0006] (“A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).”) Kempf at [0007] (“A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing

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		system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”) Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities

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		while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.") Kempf at [0040] ("The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0044] ("FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") As another example, OpenFlow is a standard protocol used in SDNs to communicate between an OpenFlow switch and controller. OpenFlow at 6-7

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		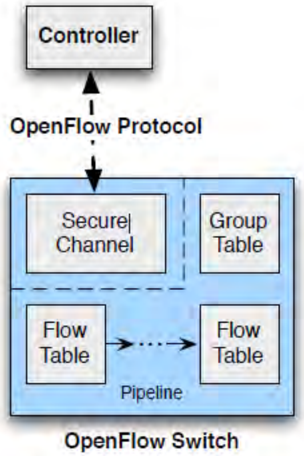 Figure 1: Main components of an OpenFlow switch. **2 Switch Components** An OpenFlow Switch consists of one or more *flow tables* and a *group table*, which perform packet lookups and forwarding, and an *OpenFlow channel* to an external controller (Figure 1). The switch communicates with the controller and the controller manages the switch via the OpenFlow protocol. Using the OpenFlow protocol, the controller can add, update, and delete *flow entries* in flow tables, both reactively (in response to packets) and proactively. Each flow table in the switch contains a set of flow entries; each flow entry consists of *match fields*, *counters*, and a set of *instructions* to apply to matching packets (see 5.2). Matching starts at the first flow table and may continue to additional flow tables (see 5.1). Flow entries match packets in priority order, with the first matching entry in each table being used (see 5.3). If a matching entry is found, the instructions associated with the specific flow entry are executed. If no match is found in a flow table, the outcome depends on configuration of the table-miss flow entry: for example, the packet may be forwarded to the controller over the OpenFlow channel, dropped, or may continue to the next flow table (see 5.4). Instructions associated with each flow entry either contain actions or modify pipeline processing (see 5.9). Actions included in instructions describe packet forwarding, packet modification and group table

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		processing. Pipeline processing instructions allow packets to be sent to subsequent tables for further processing and allow information, in the form of metadata, to be communicated between tables. Table pipeline processing stops when the instruction set associated with a matching flow entry does not specify a next table; at this point the packet is usually modified and forwarded (see 5.10). Flow entries may forward to a *port*. This is usually a physical port, but it may also be a logical port defined by the switch or a reserved port defined by this specification (see 4.1). Reserved ports may specify generic forwarding actions such as sending to the controller, flooding, or forwarding using non-OpenFlow methods, such as "normal" switch processing (see 4.5), while switch-defined logical ports may specify link aggregation groups, tunnels or loopback interfaces (see 4.4). Actions associated with flow entries may also direct packets to a group, which specifies additional processing (see 5.6). Groups represent sets of actions for flooding, as well as more complex forwarding semantics (e.g. multipath, fast reroute, and link aggregation). As a general layer of indirection, groups also enable multiple flow entries to forward to a single identifier (e.g. IP forwarding to a common next hop). This abstraction allows common output actions across flow entries to be changed efficiently. The group table contains group entries; each group entry contains a list of *action buckets* with specific semantics dependent on group type (see 5.6.1). The actions in one or more action buckets are applied to packets sent to the group. Switch designers are free to implement the internals in any way convenient, provided that correct match and instruction semantics are preserved. For example, while a flow entry may use an all group to forward to multiple ports, a switch designer may choose to implement this as a single bitmask within the hardware forwarding table. Another example is matching; the pipeline exposed by an OpenFlow switch may be physically implemented with a different number of hardware tables.

No.	'111 Patent Claim 27	Chandrasekaran
27	The method according to claim 1, wherein the network node comprises a router, a switch, or a bridge.	Chandrasekaran discloses the method according to claim 1, wherein the network node comprises a router, a switch, or a bridge. For example, Chandrasekaran discloses an access point and other nodes that may be routers, switches, gateways, or other network devices. *See supra* at Claim 1. Chandrasekaran at [0012] ("Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For

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		simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”)

No.	'111 Patent Claim 28	Chandrasekaran
28	The method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet.	Chandrasekaran discloses the method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet. For example, Chandrasekaran discloses a network and packet that may belong to the Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof. A person of ordinary skill in the art would understand that the network may be an Internet Protocol network and that the packet may belong to an Internet Protocol network and be an IP packet. *See supra* at Claim 1. Chandrasekaran at [0012] ("Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.") Chandrasekaran at [0017] ("The stateful classifier 18 at the controller 12 classi-fies traffic based on multiple packets received from the begin-ning of a flow. Stateful classification uses rules which need information on states for a previous packet (or packets) in a flow. Stateful classification may be based, for example, on packet pattern matching and decoding

No.	’111 Patent Claim 28	Chandrasekaran
		of protocols and their states. Stateful classification is also referred to as flow clas-sification since it looks at a data stream of related packets (flow, session).”) Chandrasekaran at [0018] (“The stateless classifier 22 at the AP 14 uses rules that can act on a per packet basis in the flow. Stateless classifica-tion (also referred to as packet classification) is based on individual packet inspection (e.g., 5 tuple, pattern matching) without knowledge of any related stream of packets, flows, sessions, or protocols.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g., source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”)

No.	’111 Patent Claim 29	Chandrasekaran
29	The method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet.	Chandrasekaran discloses the method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet. For example, Chandrasekaran discloses a network and packet that may belong to the Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof. A person of ordinary skill in the art would understand that the network may be an Transmission Control Protocol network and that the packet may belong to an Transmission Control Protocol network and be a TCP packet. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet would have been obvious to a person having ordinary skill in the art, as explained below.

No.	’111 Patent Claim 29	Chandrasekaran
		See supra at Claim 28. Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0017] (“The stateful classifier 18 at the controller 12 classi-fies traffic based on multiple packets received from the begin-ning of a flow. Stateful classification uses rules which need information on states for a previous packet (or packets) in a flow. Stateful classification may be based, for example, on packet pattern matching and decoding of protocols and their states. Stateful classification is also referred to as flow clas-sification since it looks at a data stream of related packets (flow, session).”) Chandrasekaran at [0018] (“The stateless classifier 22 at the AP 14 uses rules that can act on a per packet basis in the flow. Stateless classifica-tion (also referred to as packet classification) is based on individual packet inspection (e.g., 5 tuple, pattern matching) without knowledge of any related stream of packets, flows, sessions, or protocols.”) Chandrasekaran at [0023] (“In one embodiment, the classification information 26 transmitted from the controller 12 to the AP 14 includes tuple information for a flow (e.g.,

No.	’111 Patent Claim 29	Chandrasekaran
		source IP address, destina-tion IP address, source port, destination port, and protocol), application identifier (ID), and stateless DPI information. Stateless DPI information includes classification and sub-classification information (e.g., fixed or variable offset with a pattern or regular expression) and rules for applying policies on the sub-classified packets. The policies may include, for example, drop packet, mark a DSCP (Differentiated Services Code Point) value in the packet, or rate limit the traffic.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 29 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses TCP packets. Copeland at Figure 2

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		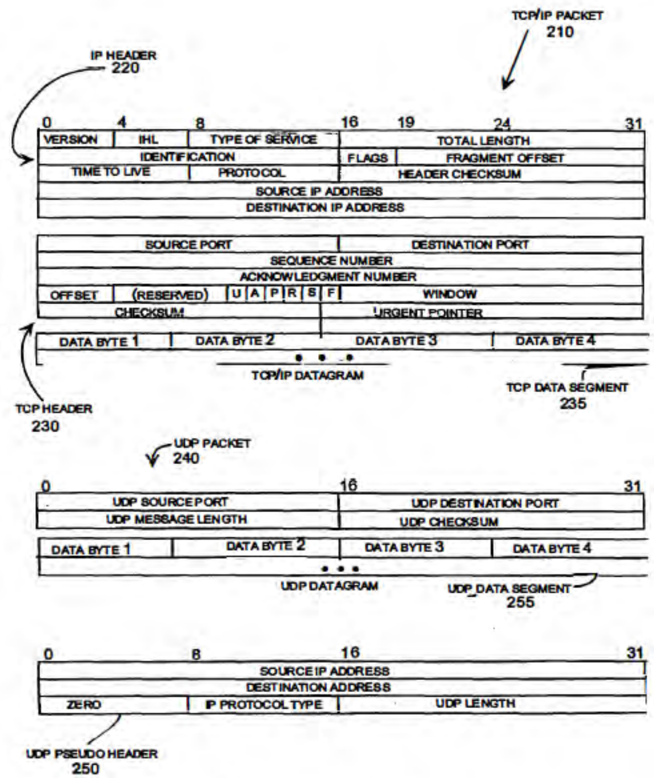 PACKET HEADERS FIG. 2 Copeland at [0076] (“FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.”)

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		Copeland at [0077] ("The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.") For example, Chua discloses packet traffic using TCP services. Chua at 18:8-44 ("Based on the rule set for a specific device, including what traffic is allowed through, from what zones and expected targets, administrator 114 can infer the right type of test traffic that should be injected for both positive and negative testing of the device. Similarly, the inference can be made to deter-mine the appropriate type of flow troubleshooting that includes the appropriate IP ranges to watch on, and the TCP/ UDP services that the flowchain is meant to service. In the case of traffic injection to test a path through SDN 106, path verification unit 136 of SDN controller 112 may perform any of the following tasks: Infer from the flowchain the appropriate type of transmission control protocol (TCP) or uniform datagram proto-col (UDP) services that are relevant to the chain, as well as the range of source and target IP addresses for this chain Create either UDP packet flows or TCP sessions that confirm to the traffic type inferred or discovered form the flowchain configuration Using an SDN device (e.g., a switch of SDN 106), inject these flows or TCP sessions by temporarily inserting a rule into the rules table on the switch that will take the flows from SDN controller 112 and send them across the devices of SDN 106 (starting from the ingress device in the chain) Using an SDN device, insert flow rules to replicate (flow-span) these same traffic streams at each point in the flow chain. The replicated traffic may be directed (via SDN rules) to a collection device (or to SDN controller 112) that can determine whether the test packets passed through each port on the switch that is part of the flowchain

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		On the final exit device (prior to the end target), insert a flow rule that will drain all injected packets so the final devices (that is, devices external to SDN 106) do not see any of the test traffic.”)

No.	’111 Patent Claim 30	Chandrasekaran
30[a]	The method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets;	Chandrasekaran discloses the method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets. For example, Chandrasekaran discloses data traffic sent from a mobile device over a network to the access point second and additional packets in a flow. *See supra at* Claim 1, 1[c]. Chandrasekaran at [0010] (“In order to provide end-to-end Quality of Service (QoS), policies should be applied to both upstream and down-stream traffic. In wireless networks, this would involve apply-ing policies at both a controller and an access point. Applica-tion classification is needed if the policies are application dependent. However, when a client roams between access points, it may interrupt classification performed at the access point, since classification of the application is based on mul-tiple packets and with roaming, the first packet of the flow may arrive on one access point and the second on another access point.”) Chandrasekaran at [0019] (“As noted above, stateful classification uses rules which need information on states for previous packets in a flow. When the client 16 roams (as shown in FIG. 1), the first packet of the flow may be received on one AP 14 and the second packet on another AP. Stateful classification is there-fore performed at the controller 12 rather than the AP 14 so that stateful packet inspection is not broken when the client 16 roams. As described below, when the client 16 roams, the controller 12 pushes the same classification rules and policies that it previously sent to the original AP to the new AP.”)

No.	’111 Patent Claim 30	Chandrasekaran
30[b]	checking, by the network node, if any one of the one or more additional packets satisfies the criterion;	Chandrasekaran discloses checking, by the network node, if any one of the one or more additional packets satisfies the criterion. *See supra at* Claim 1[d], 30[a].
30[c]	responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity; and	Chandrasekaran discloses responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity. *See supra at* Claim 1[e], 30[a].
30[d]	responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction.	Chandrasekaran discloses responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction. *See supra at* Claim 1[f], 30[a].

No.	'111 Patent Claim 31	Chandrasekaran
31[a]	The method according to claim 1, wherein the packet network is a Software Defined Network (SDN),	Chandrasekaran discloses the method according to claim 1, wherein the packet network is a Software Defined Network (SDN). For example, Chandrasekaran discloses a wireless controller and access point are configured to communicate to transmit network traffic. A person of ordinary skill in the art would understand the communication between the controller and access point to be a software defined network. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, wherein the packet network is a Software Defined Network (SDN) would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 1. Chandrasekaran at Abstract ("In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.") Chandrasekaran at [0007] ("In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.") Chandrasekaran at [0012] ("Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless

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		communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”)

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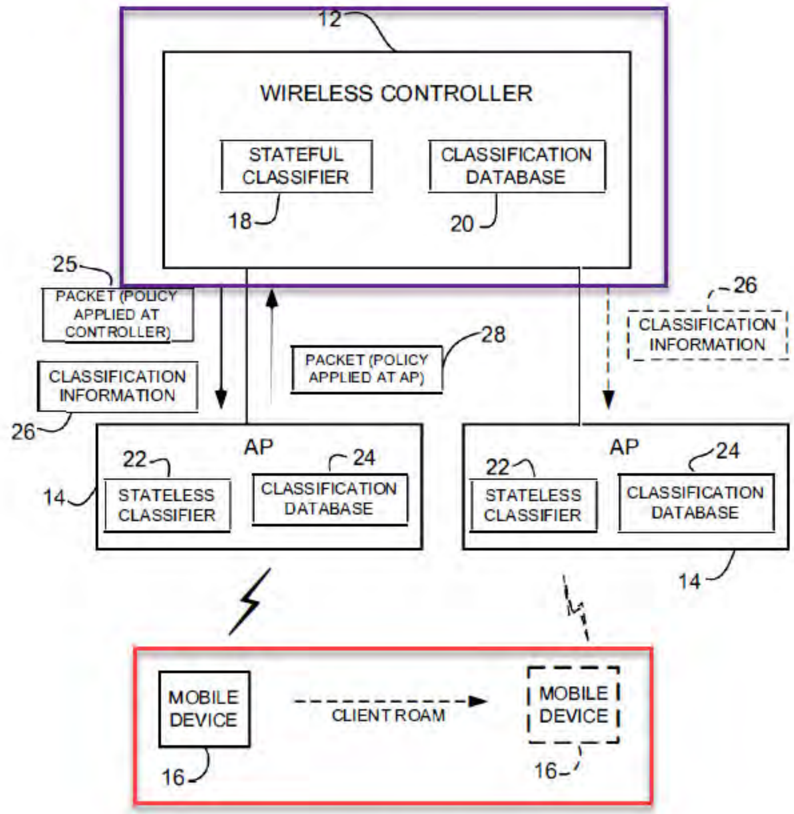
		Chandrasekaran at Figure (annotations added)  FIGURE 1 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chadrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more

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		together) of the references identified in element 31[a] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses a packet network using the OpenFlow protocol which is used in Software Defined Networks. Kempf at [0004] (“The GPRS tunneling protocol (GTP) is an important communication protocol utilized within the GPRS core net-work. GTP enables end user devices (e.g., cellular phones) in a GSM network to move from place to place while continuing to connect to the Internet. The end user devices are connected to other devices through a gateway GPRS support node (GGSN). The GGSN tracks the end user device's data from the end user device's serving GPRS support node (GGSN) that is handling the session originating from the end user device.”) Kempf at [0006] (“A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control

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		protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).") Kempf at [0007] ("A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.") Kempf at [0038] ("Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC")

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		Kempf at [0039] ("The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.") Kempf at [0040] ("The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0044] ("FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") As another example, Chua discloses techniques and methods related to software defined networks (SDNs).

No.	’111 Patent Claim 31	Chandrasekaran
		Chua at 1:45-55 (“In general, this disclosure describes techniques related to controlling software defined networks (SDNs). A software defined network is generally a network of interconnected computing devices having forwarding planes or data planes that can be programmed remotely by one or more controller devices. In this manner, the control plane can be physically separate from the data plane (or forwarding plane) for an SDN. These computing devices can have either physical instantiation or virtual (software-only) instantiation without the presence of a hardware appliance. This disclosure describes various techniques related to controlling SDNs.”) Chua at 1:56-63 (“In one example, a method includes determining, by a con-troller device for a software defined network, connections between network devices in the software defined network, determining, by the controller device, one or more paths for network traffic between the network devices based on the determination of the connections, and programming, by the controller device, the network devices to direct network traf-fic along the one or more paths.”) Chua at 2:14-20 (“In another example, a method includes programming, by a controller device for a software defined network (SDN), a first network device of the SDN to send packets of a packet flow to a service device, and programming, by the controller device, one or more network devices of the SDN to perform a programmed action on packets of the packet flow based on data received from the service device for the packet flow.”) Chua at 2:38-48 (“In another example, a method includes programming, by a controller device for a software defined network (SDN), a set of network devices of the SDN to form a path through the SDN and to send data representative of packets sent along the path to the controller device, sending, by the controller device, packets of a packet flow corresponding to the path to one of the set of network devices, determining, by the controller device, whether the set of network devices is properly forwarding the packets of the packet flow along the path based on data received from the set of network devices, and present-ing a report representative of the determination.”) Chua at 5:50-6:5 (“SDN 106 generally serves to interconnect various endpoint devices, such as client device 102 and server device 104. In addition, SDN 106 may provide services to network traffic flowing between client device 102 and server device 104. Alternatively,

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		SDN 106 may provide services to client device 102, without further directing traffic to server device 106. For example, administrator 114 may use SDN controller 112 to program network devices of SDN 106 to direct network traffic for client device 102 to one or more of service devices 116. Service devices 116 may include, for example, intrusion detection service (IDS) devices, intrusion prevention system (IPS) devices, web proxies, web servers, web-application firewalls and the like. In other examples, service devices 116 may, additionally or alternatively, include devices for provid-ing services such as, for example, denial of service (DoS) protection, distributed denial of service (DDoS) protection, traffic filtering, wide area network (WAN) acceleration, or other such services. Service devices 116 may also addition-ally or alternatively include malware detection devices, net-work anti-virus devices, network packet capture and analysis devices, honeypot devices, reflector net devices, tar pit devices, domain name service (DNS) and global DNS server devices, mail proxies, and anti-spam devices.")
31[b]	the packet is routed as part of a data plane and	Chandrasekaran discloses the packet is routed as part of a data plane. For example, Chandrasekaran routing packets in a network utilizing a controller and access point. A person of ordinary skill in the art would understand that the packet is routed over a data plane. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, the packet is routed as part of a data plane would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 1. Chandrasekaran at Abstract ("In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.")

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		Chandrasekaran at [0007] (“In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.”) Chandrasekaran at [0012] (“Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.”) Chandrasekaran at [0013] (“In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.”) Chandrasekaran at [0014] (“The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control

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		functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.") Chandrasekaran at Figure (annotations added)

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		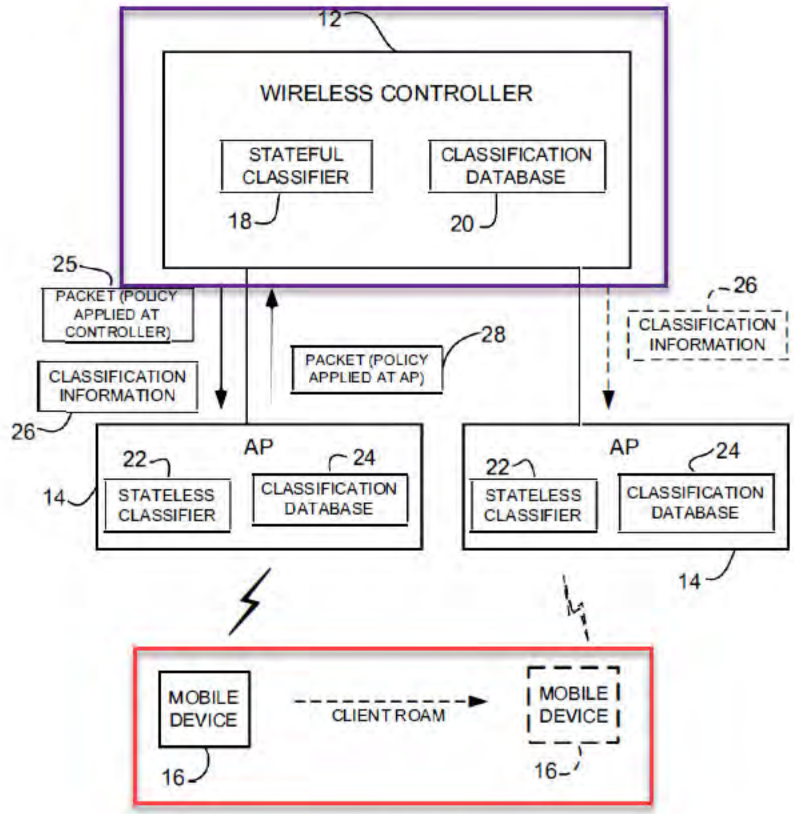 FIGURE 1 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 31[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

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		For example, Kempf discloses routing packets on a data plane using a control protocol. Kempf at [0006] ("A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).") Kempf at [0007] ("A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud

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		computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.”) Kempf at [0038] (“Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC”) Kempf at [0039] (“The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.”)

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		Kempf at [0040] ("The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0041] ("The standard EPC control plane entities-the MME, PCRF, and HSS-are likewise deployed in the cloud, along with the control plane parts of the S-GW and P-GW, namely, the S-GW-C and the P-GW-C. The data plane con-sists of standard OpenFlow switches with enhancements as needed for routing GTP packets, rather than IP routers and Ethernet switches. At a minimum, the data plane parts of the S-GW and P-GW, namely, the S-GW-Dand the P-GW-D, and the packet routing part of the E-NodeB in the E-UTRAN require OpenFlow enhancements for GTP routing. Addi-tional enhancements for GTP routing may be needed on other switches within the EPC architecture depending on how much fine grained control over the routing an operator requires.") Kempf at [0078] ("FIG. 15 is a diagram of one embodiment of how the EPC in the cloud computing system enables a managed ser-vices company to manage multiple operator networks out of a single data center. The managed services cloud computing facility 1501 runs separate instances of the EPC control plane for every mobile operator with which the managed services company has a contract. Each EPC instance is in a VPC 1503A,B that isolates the mobile operator's traffic from other tenants in the cloud computing facility 1501 of the data cen-ter. The EPC control plane instance for a mobile operator is connected to the mobile operator's geographically distributed EPC OpenFlow data plane switching fabric 1507 A,B and the mobile operator's base stations through a virtual edge router 1509A,B. The virtual edge router 1509A,B routes traffic from the data center to and from the appropriate mobile operator EPC data plane switching fabric 1507 A,B. In some cases, the mobile operators may even share base stations and EPC switching fabrics, though the

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		example embodiment in FIG. 15 shows a case where the two mobile operators have separate switching fabrics.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0093] (“The virtual port simply removes the GTP tunnel header and forwards the enclosed user data plane packet out the bound physical port.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are:

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		Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)") Kempf at [0145] ("In other embodiments, other control protocols can be utilized in place of OpenFlow as described herein. The use of OpenFlow is presented by way of example and not limita-tion. Other control protocols can also be utilized to manage the communication between the control plane and data plane and configuration of the data plane of the split EPC architec-ture. An example of such a protocol is FORCES, an IETF standard protocol for splitting the control plane and forward-ing plane in networks. The FORCES protocol specification is described in RFC 5810. RFC 5812 describes the architecture of a FORCES forwarding element, the equivalent of an Open-Flow switch. The FORCES protocol itself does not directly support programming routes into the forwarding element, it is, instead, a framework for handling the interaction between the FORCES controller and a FORCES forwarding element. The forwarding element architecture describes how to design the protocol that actually allows a FORCES controller to program a FORCES forwarding element. One skilled in the art would understand that a FORCES based system could include features described herein above in relation to the OpenFlow embodiment, such as the GTP OpenFlow exten-sion, to allow the controller to program the switches for GTP TEID routing.") As another example, Chua discloses forwarding packets over a data plane to various network destinations. Chua at 1:45-55 ("In general, this disclosure describes techniques related to controlling software defined networks (SDNs). A software defined network is generally a network of interconnected computing devices having forwarding planes or data planes that can be programmed remotely by one or more controller devices. In this manner, the control plane can be physically separate from the data plane (or forwarding plane) for an SDN. These computing devices can have either physical instantiation or virtual (software-only) instantiation without the presence of a hardware appliance. This disclosure describes various techniques related to controlling SDNs.") Chua at 1:56-63 ("In one example, a method includes determining, by a con-troller device for a software defined network, connections between network devices in the software defined

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		network, determining, by the controller device, one or more paths for network traffic between the network devices based on the determination of the connections, and programming, by the controller device, the network devices to direct network traf-fic along the one or more paths.”) Chua at 23:22-34 (“FIG. 4 illustrates various devices and services organized according to the "control plane" and the "data plane." In general, devices and services of the control plane manage devices of the data plane to cause the devices of the data plane to forward data traffic between various network destinations. In conventional routers, each router includes functionality for both the control plane and the data plane, and the same is true for conventional switches. However, in accordance with the techniques of this disclosure, the control plane can be entirely separated from the data plane, such that an SDN controller, such as SDN controller 112, can program devices of the data plane, such as network switches, to perform the techniques of this disclosure.”) Chua at 23:35:45 (“FIG. 4 is a conceptual diagram illustrating an example flow management system 250 including various components that may operate in accordance with the techniques of this disclo-sure. Flow management system 250 (also referred to as "sys-tem 250") includes control plane 252 and data plane 280. In general, control plane 252 includes components that relate to control information, e.g., routing information relating to packet flows and paths through an SDN. Data plane 280 generally includes components that send, forward, and/or receive data in accordance with control information from components of control plane 252.”) Chua at 24:20-36 (“In accordance with the techniques of this disclosure, flow management server 256 programs network switches 282, based on connections between network switches 282, to form paths through an SDN. For example, flow management server 256 may program network switches 282 to establish a path between TCP client 284 and server 288, and/or a path between TCP client 284 and multicast source 286. In some examples, flow management server 256 may program net-work switches 282 to define multiple paths, e.g., a primary path and one or more backup paths, as discussed above. Likewise, flow management server 256 may send test traffic through network switches 282 to test one or more of the paths. Data plane 280 may include one or more service devices (such as web proxy devices, IDS devices, and/or web serv-ers), to which network switches 282 may direct network packets. Server 288 may represent a service device of an SDN controlled by control plane 252, in some examples.”)

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31[c]	the network node communication with the controller serves as a control plane.	Chandrasekaran discloses the network node communication with the controller serves as a control plane. For example, Chandrasekaran discloses a wireless controller and access point are configured to communicate to transmit network traffic. A person of ordinary skill in the art would understand the communication between the controller and access point occurs over a control plane. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Chandrasekaran is found to not meet this limitation, the network node communication with the controller serves as a control plane would have been obvious to a person having ordinary skill in the art, as explained below Chandrasekaran at Abstract ("In one embodiment, a method includes performing stateful application classification on packets received at a controller and transmitting classification information to an access point. The classification information includes flow information and stateless rules for applying policies. The access point is con-figured to use the classification information to perform state-less application classification and apply policies to packets received from a mobile device. An apparatus and logic are also disclosed herein.") Chandrasekaran at [0007] ("In one embodiment, a method generally comprises performing stateful application classification on packets received at a controller and transmitting classification infor-mation to an access point. The classification information comprises flow information and stateless rules for applying policies. The access point is configured to use the classifica-tion information to perform stateless application classifica-tion and apply policies to packets received from a mobile device.")

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		Chandrasekaran at [0012] ("Referring now to the drawings, and first to FIG.1, an example of a network in which embodiments described herein may be implemented is shown. For simplification, only a small number of network devices are shown. The network includes a wireless controller 12 in communication with a mobile device (client, wireless device, endpoint) 16 through an access point (AP) 14. In the example shown in FIG. 1, the controller 12 is in wired communication with two access points 14 for wireless communication with any number of mobile devices 16 via a wireless network (e.g., WLAN (wire-less local area network)) at a network site. The wireless con-troller 12 may be in communication with one or more other networks (not shown) (e.g., Internet, intranet, local area net-work, wireless local area network, cellular network, metro-politan area network, wide area network, satellite network, radio access network, public switched network, virtual pri-vate network, or any other network or combination thereof). Communication paths between the wireless controller 12 and other networks or between the controller and access points 14 may include any number or type of intermediate nodes (e.g., routers, switches, gateways, or other network devices), which facilitate passage of data between network devices.") Chandrasekaran at [0013] ("In one example, the wireless controller 12 receives upstream traffic transmitted from the mobile device 16 and destined for another endpoint (e.g., host, user device), and transmits downstream traffic received from the endpoint to the mobile device in a communication session. As used herein, the term 'downstream' refers to traffic transmitted from the controller 12 towards the mobile device 16, and the term 'upstream' refers to traffic transmitted from the mobile device towards the controller.") Chandrasekaran at [0014] ("The term 'wireless controller' or 'controller' as used herein may refer to a wireless LAN (local area network) controller, mobility controller, wireless control device, wire-less control system, or any other network device operable to perform control functions for a wireless network. The net-work site may also include a wireless control system or other platform for centralized wireless LAN planning, configura-tion, and management. The wireless controller 12 enables system wide functions for wireless applications and may support any number of access points 14. Each access point 14 may serve any number of mobile devices 16 in the wireless network. The wireless controller 12 may be, for example, a standalone device or a rack-mounted appliance. In the example

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		shown in FIG. 1, the wireless controller 12 and access points 14 are separate devices and may be located remote from one another. The wireless controller 12 may also be integrated with the access point 14 (e.g., autonomous AP) or located at a switch, router, switch/router, or other network device. Thus, the wireless controller 12 may be a physical device located at a standalone device, access point, switch, router, or other network device. The wireless controller 12 may also be a virtual device located in a network or cloud, for example.”) Chandrasekaran at Figure (annotations added)

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		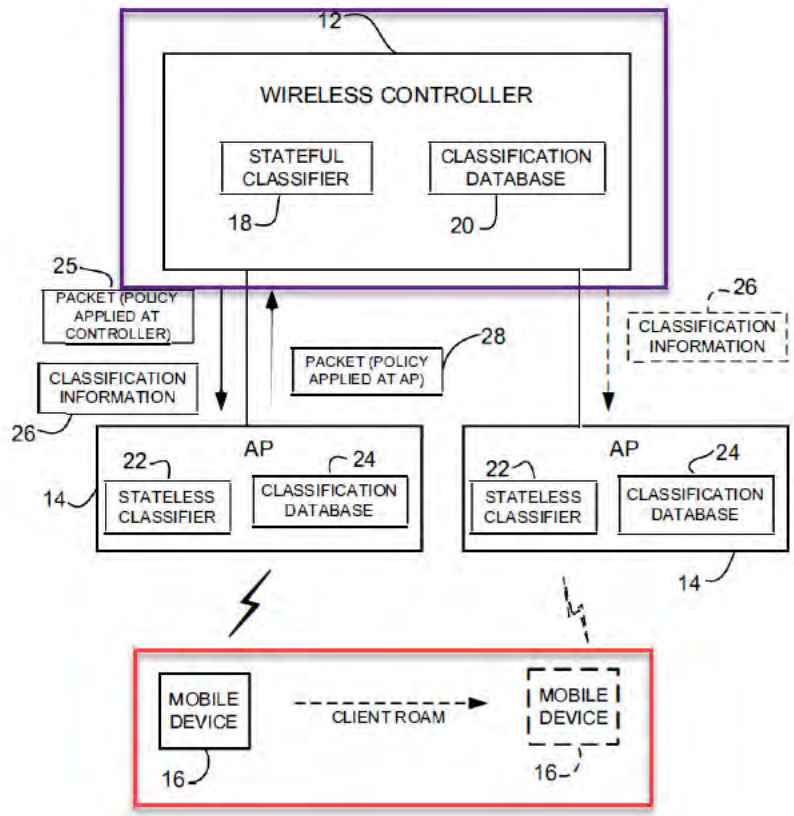 FIGURE 1 Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Chandrasekaran in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 31[c] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

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		For example, Kempf discloses communication between network elements and an OpenFlow controller over a control plane. Kempf at [0006] (“A method implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) network in a cloud com-puting system. The cloud computing system includes a cloud manager and a controller. The controller executes a plurality of control plane modules. The control plane communicates with the data plane of the EPC implemented in a plurality of network elements of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane implemented in the plurality of network elements of the 3GPP LTE network. The method comprises the steps of initializing the plurality of control plane modules of the EPC within the controller. Each control plane module in the plurality of control plane modules is initialized as a separate virtual machine by the cloud man-ager. Each control plane module provides a set of control plane functions for managing the data plane. The cloud man-ager monitors resource utilization of each control plane mod-ule and the control plane traffic handled by each control plane module. The cloud manager detects a threshold level of resource utilization or traffic load for one of the plurality of control plane modules of the EPC. A new control plane mod-ule is initialized as a separate virtual machine by the cloud manager in response to detecting the threshold level. The new control plane module shares the load of the one of the plural-ity of control plane modules and signals the plurality of net-work elements in the data plane to establish flow rules and actions to establish differential routing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV).”) Kempf at [0007] (“A cloud computer system implements a control plane of an evolved packet core (EPC) of a third generation partnership project (3GPP) long term evolution (LTE) net-work. The control plane communicates with the data plane of the EPC that is implemented in a plurality of network ele-ments of the 3GPP LTE network through a control protocol. The EPC with the control plane implemented in the cloud computing system utilizes resources more efficiently than an architecture with the control plane

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		implemented in the plu-rality of network elements of the 3GPP LTE network. The cloud computing system, comprises a controller configured to execute a plurality of control plane modules of the EPC, each control plane module configured to provide a set of control plane functions for managing the data plane and to signal the plurality of network elements in the data plane to establish flow rules and actions to establish differential rout-ing of flows in the data plane using the control protocol, wherein the control protocol is an OpenFlow protocol, and wherein flow matches are encoded using an extensible match structure in which the flow match is encoded as a type-length-value (TLV) and a cloud manager communicatively coupled to the controller. The cloud manager is configured to initialize each of the plurality of control plane modules within the controller as a separate virtual machine, monitor resource utilization of each control plane module and the control plane traffic handled by each control plane module, detect whether a threshold level ofresource utilization or traffic load has been reached by any of the plurality of control plane modules of the EPC, and initialize a new control plane module as a separate virtual machine in response to detecting the threshold level, the new control plane module to share the load of the one of the plurality of control plane modules that exceeded the threshold level.") Kempf at [0038] ("Implementing the control plane of an EPC in a cloud computing facility and the data plane of the EPC using a set of OpenFlow switches, as well as managing communication between the control plane and the dataplane using the Open-Flow protocol (e.g., OpenFlow 1.1), creates a problem that the OpenFlow protocol does not support GTP or GTP tunnel endpoint identifier (TEID) routing, which is necessary for implementing the dataplane of the EPC") Kempf at [0039] ("The embodiments of the invention overcome these disadvantages of the prior art. The disadvantages of the prior art are avoided by splitting the control plane and the data plane for the EPC architecture and to implement the control plane by deploying the EPC control plane entities in a cloud computing facility, while the data plane is implemented by a distributed collection of OpenFlow switches. The OpenFlow protocol is used to connect the two, with enhancements to support GTP routing. While the EPC architecture already has a split between the control plane and the data plane, in the sense that the serving gateway (S-GW) and the PDN gateway (P-GW) are data plane entities while the MME, PCRF, and home subscriber server (HSS) are control plane entities, this split was made at the level of the mobility management pro-tocol, GTP.")

No.	’111 Patent Claim 31	Chandrasekaran
		Kempf at [0040] (“The standard EPC architecture assumes a standard routed IP network for transport on top of which the mobile network entities and protocols are implemented. The enhanced EPC architecture described herein is instead at the level ofIP routing and media access control (MAC) switch-ing. Instead of using L2 routing and L3 internal gateway protocols to distribute IP routing and managing Ethernet and IP routing as a collection of distributed control entities, L2 and L3 routing management is centralized in a cloud facility and the routing is controlled from the cloud facility using the OpenFlow protocol. As used herein, the "OpenFlow proto-col" refers to the OpenFlow network protocol and switching specification defined in the OpenFlow Switch Specification at www.openflowswitch.org a web site hosted by Stanford Uni-versity. As used herein, an "OpenFlow switch" refers to a network element implementing the OpenFlow protocol.) Kempf at [0041] (“The standard EPC control plane entities-the MME, PCRF, and HSS-are likewise deployed in the cloud, along with the control plane parts of the S-GW and P-GW, namely, the S-GW-C and the P-GW-C. The data plane con-sists of standard OpenFlow switches with enhancements as needed for routing GTP packets, rather than IP routers and Ethernet switches. At a minimum, the data plane parts of the S-GW and P-GW, namely, the S-GW-Dand the P-GW-D, and the packet routing part of the E-NodeB in the E-UTRAN require OpenFlow enhancements for GTP routing. Addi-tional enhancements for GTP routing may be needed on other switches within the EPC architecture depending on how much fine grained control over the routing an operator requires.”) Kempf at [0078] (“FIG. 15 is a diagram of one embodiment of how the EPC in the cloud computing system enables a managed ser-vices company to manage multiple operator networks out of a single data center. The managed services cloud computing facility 1501 runs separate instances of the EPC control plane for every mobile operator with which the managed services company has a contract. Each EPC instance is in a VPC 1503A,B that isolates the mobile operator's traffic from other tenants in the cloud computing facility 1501 of the data cen-ter. The EPC control plane instance for a mobile operator is connected to the mobile operator's geographically distributed EPC OpenFlow data plane switching fabric 1507 A,B and the mobile operator's base stations through a virtual edge router 1509A,B. The virtual edge router 1509A,B routes traffic from the data center to and from the appropriate mobile operator EPC data plane switching fabric 1507 A,B. In some cases, the

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		mobile operators may even share base stations and EPC switching fabrics, though the example embodiment in FIG. 15 shows a case where the two mobile operators have separate switching fabrics.") Kempf at [0087] ("In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.") Kempf at [0093] ("The virtual port simply removes the GTP tunnel header and forwards the enclosed user data plane packet out the bound physical port.") Kempf at [0101] ("In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are:

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		Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) Kempf at [0145] (“In other embodiments, other control protocols can be utilized in place of OpenFlow as described herein. The use of OpenFlow is presented by way of example and not limita-tion. Other control protocols can also be utilized to manage the communication between the control plane and data plane and configuration of the data plane of the split EPC architec-ture. An example of such a protocol is FORCES, an IETF standard protocol for splitting the control plane and forward-ing plane in networks. The FORCES protocol specification is described in RFC 5810. RFC 5812 describes the architecture of a FORCES forwarding element, the equivalent of an Open-Flow switch. The FORCES protocol itself does not directly support programming routes into the forwarding element, it is, instead, a framework for handling the interaction between the FORCES controller and a FORCES forwarding element. The forwarding element architecture describes how to design the protocol that actually allows a FORCES controller to program a FORCES forwarding element. One skilled in the art would understand that a FORCES based system could include features described herein above in relation to the OpenFlow embodiment, such as the GTP OpenFlow exten-sion, to allow the controller to program the switches for GTP TEID routing.”) As another example, Chua discloses the network device’s communication with the SDN controller over the control plane as controlling and programming the network devices to direct network traffic along one or more paths. Chua at 1:64-2:5 (“In another example, a controller device for a software defined network includes one or more interfaces for commu-nicating with network devices in the software defined net-work, and one or more processors configured to determine connections between the network devices, determine one or more paths for network traffic between the network devices based on the determination of the connections, and program the network devices to direct network traffic along the one or more paths.”) Chua at 2:21-29 (“In another example, a controller device for a software defined network (SDN) includes one or more network inter-faces configured to communicate with network

No.	’111 Patent Claim 31	Chandrasekaran
		devices of the SDN, and one or more processors configured to program a first network device of the SDN to send packets of a packet flow to a service device, and program one or more network devices of the SDN to perform a programmed action on packets of the packet flow based on data received from the service device for the packet flow.”) Chua at 2:49-61 (“In another example, a controller device for a software defined network (SDN) includes one or more network interfaces configured to communicate with network devices of the SDN, and one or more processors configured to program a set of network devices of the SDN to form a path through the SDN and to send data representative of packets sent along the path to the controller device, send, via one of the network interfaces, packets of a packet flow corresponding to the path to one of the set of network devices, determine whether the set of network devices is properly forwarding the packets of the packet flow along the path based on data received from the set of network devices, and present a report representative of the determination.”) Chua at 23:62-24:4 (“OpenFlow is an example of an SDN protocol. That is, in some examples, SDN controller 270 may conform to the OpenFlow protocol. However, it should be understood that other protocols may be used in conjunction with a software defined network. In general, any protocol that gives access to the forwarding plane or data plane of a networking (e.g., a switch or router) to a remote device over a network may be used in accordance with the techniques of this disclo-sure, other example protocols include XMPP, RESTful APIs, Cisco OnePK, IETF I2RS (Interface to Routing Systems).”)

EXHIBIT D-4
Defendant's Preliminary Invalidity Contentions
Orckit Corporation v. Cisco Systems, Inc., 2:22-cv-00276-JRG-RSP

Chart for U.S. Patent 10,652,111 ("the '111 Patent")
U.S. Patent No. 9,264,400 to Lin et al. ("Lin '400")

As shown in the chart below, all Asserted Claims of the '111 Patent are invalid under (1) AIA-35 U.S.C. § 102 (a) because Lin '400 meets each element of those claims, and/or (2) 35 U.S.C. § 103 because Lin '400 renders those claims obvious either alone, or in combination with the knowledge of a person having ordinary skill in the art, and in further combination with the references specifically identified below and in the following claim chart and/or one or more references identified in Defendant's Preliminary Invalidity Contentions. The following quotations and diagrams come from Lin '400 titled "Software Defined Networking Pipe For Network Traffic Inspection", which was filed on Dec. 2, 2013, and issued on February 16, 2016.

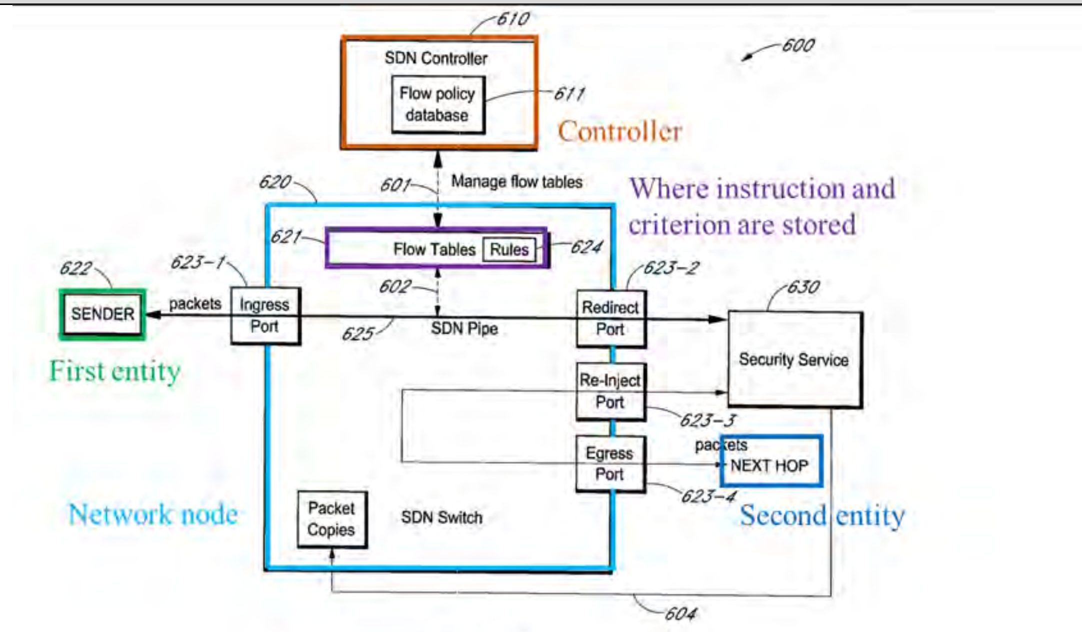
Motivations to combine the disclosures in Lin '400 with disclosures in other publications known in the art, as explained in this chart, include at least the similarity in subject matter between the references to the extent they concern methods relating to routing certain network traffic to entities for further analysis and inspection. Insofar as the references cite other patents or publications, or suggest additional changes, one of ordinary skill in the art would look beyond a single reference to other references in the field.

These invalidity contentions are based on Defendant's present understanding of the Asserted Claims, and Orckit's apparent construction of the claims in its November 3, 2022 Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1, and Orckit's January 19, 2023 First Amended Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1 (Orckit's "Infringement Disclosures"), which is deficient at least insofar as it fails to cite any documents or identify accused structures, acts, or materials in the Accused Products with particularity. Defendant does not agree with Orckit's application of the claims, or that the claims satisfy the requirements of 35 U.S.C. § 112. Defendant's contentions herein are not, and should in no way be seen as, admissions or adoptions as to any particular claim scope or construction, or as any admission that any particular element is met by any accused product in any particular way. Defendant objects to any attempt to imply claim construction from this chart. Defendant's prior art invalidity contentions are made in a variety of alternatives and do not represent Defendant's agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein.

The following contentions are subject to revision and amendment pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules, and the Orders of record in this matter subject to further investigation and discovery regarding the prior art and the Court's construction of the claims at issue.

No.	'111 Patent Claim 1	Lin '400
1[preamble]	A method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising:	Lin '400 discloses a method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node. For example, Lin '400 discloses that it relates to a software defined networking (SDN) computer network under the control of an SDN controller over the SDN computer network, from a sender component through an ingress port, out an egress port, and to the "next hope" destination. Lin '400 further discloses that the SDN controller is external to the SDN switch. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Lin '400 1:7-9 ("The present invention relates generally to computer security, and more particularly but not exclusively to software defined networking."). Lin '400 1:58-2:4 ("In one embodiment, a software defined networking (SDN) computer network includes an SDN controller and an SDN switch. The SDN controller inserts flow rules in a flow table of the SDN switch to create an SDN pipe between a sender component and a security component. A broadcast function of the SDN switch to the ports that form the SDN pipe may be disabled. The SDN pipe allows outgoing packets sent by the sender component to be received by the security component. The security component inspects the outgoing packets for compliance with security policies and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection. The SDN controller may also insert a flow rule in the flow table of the SDN switch to bypass inspection of specified packets."). Lin '400 2:47-65 ("FIG. 2 shows a schematic diagram of a computer system 100 that may be employed with embodiments of the present invention. The computer system 100 may be employed as a control plane and/or a data plane, for example. As another example, the computer system 100 may be employed to host a virtualization environment that supports a plurality of virtual machines. The computer system 100 may have fewer or more components

No.	’111 Patent Claim 1	Lin ’400
		to meet the needs of a particular application. The computer system 100 may include one or more processors 101. The computer system 100 may have one or more buses 103 coupling its various components. The computer system 100 may include one or more user input devices 102 (e.g., keyboard, mouse), one or more data storage devices 106 (e.g., hard drive, optical disk, Universal Serial Bus memory), a display monitor 104 (e.g., liquid crystal display, flat panel monitor), a computer network interface 105 (e.g., network adapter, modem), and a main memory 108 (e.g., random access memory). The computer network interface 105 may be coupled to a computer network 109.”). Lin ’400 3:25-33 (“Another way of intercepting network traffic is to mirror the packets to be inspected on a switch that provides vendor specific mirroring application programming interface (API) as shown in FIG. 4. A user may make an API call such that particular packets that enter the ingress port of the switch are redirected or mirrored to the security service by way of a connection tunnel or a mirror port. The security service may forward the redirected or mirrored packets back to an egress port of the switch after inspection.”). Lin ’400 3:40-64 (“Referring now to FIG. 6, there is shown a schematic diagram of an SDN computer network 600 in accordance with an embodiment of the present invention. In one embodiment, the SDN computer network 600 is compliant with the OpenFlow™ protocol. Accordingly, in one embodiment, the SDN controller 610 comprises an OpenFlow™ controller and the SDN switch 620 comprises an OpenFlow™ switch. The SDN controller 610 and the SDN switch 620 comprise the control plane and data plane, respectively, of the SDN computer network 600. The SDN computer network 600 may have a plurality of SDN switches 620 but only one is shown for clarity of illustration. The SDN controller 610 and the SDN switch 620 are logically separate components. In one embodiment, the SDN computer network 600 is a virtual computer network that allows for transmission of packets from one virtual machine to another. Accordingly, the SDN controller 610 may comprise a virtual OpenFlow™ controller and the SDN switch 620 may comprise a virtual OpenFlow™ switch. The SDN computer network 600 may be implemented in a computer system comprising one or more computers that host a virtualization environment. For example, the SDN computer network 600 may be implemented in the Amazon Web Services™ virtualization environment. The sender component 622 may be a virtual machine in that embodiment.”).

No.	’111 Patent Claim 1	Lin ’400
		 *FIG. 6* Fig. 6 (annotation added) Lin ’400 4:33-67 (“The SDN switch 620 may comprise a plurality of ports 623 (i.e., 623-1, 623-2, 623-3, 623-4, etc.). The SDN switch 620 may forward packets from one port 623 to another port 623 in accordance with flow rules in the flow tables 621. In the example of FIG. 6, the port 6231-1 is coupled to a sender component 622. The port 623-1 is referred to as an “ingress port” in that it is a port for receiving outgoing packets sent by the sender component 622. Similarly, the port 623-4 is referred to as an “egress port” in that it is a port for transmitting outgoing packets sent by the sender component 622. It is to be noted that any port 623 may be employed as an “ingress port,” “egress port,” “redirect port,” or “re-inject port.” The aforementioned labels are used herein merely to illustrate processing of packets relative to the sender component 622. Packets going in the opposite direction, i.e., incoming packets that are going to the sender component 622, may be received in the egress port 623-4, forwarded to the re-inject port 623-3, received in the redirect port 623-2, and forwarded to the ingress port 623-1 toward the sender component 622.

No.	’111 Patent Claim 1	Lin ’400
		The SDN switch 620 may comprise one or more flow tables 621. The flow tables 621 may comprise one or more flow rules (labeled as 624) that indicate how to manipulate or process packets that are passing through the SDN switch 620. As a particular example, a flow rule may indicate that a packet received in the ingress port 623-1 is to be forwarded to the redirect port 623-2. Another flow rule may indicate that a packet received in the redirect port 623-2 is to be forwarded to the ingress port 623-1. The just mentioned pair of flow rules are redirect flow rules that create an SDN pipe between the sender component 622 and the security service 630, allowing the security service 630 to inspect packets sent by or going to the sender component 622. Table 1 shows an example flow table with flow rules that create an SDN pipe between the security service 630 and the sender component 622.”). Lin ’400 6:13-23 (“Once outgoing packets from the sender component 622 are inspected by the security service 630 and re-injected by the security service 630 back into the SDN switch 620 through the re-inject port 623-3 and then forwarded out to the egress port 623-4, the L2 switching logic of the SDN computer network 600 (which is controlled by the SDN controller 610) remembers that packets destined for the sender component 622 and entering the SDN switch 620 by way of the egress port 623-4 are to be forwarded to the re-inject port 623-3. This allows the security service 630 to also receive incoming packets going to the sender component 622 for inspection.”). Lin ’400 6:57-63 (“Once back in the SDN switch 620 by way of the re-inject port 623-3, the flow rules that govern packets received in the ingress port 623-1 and the redirect port 623-2 no longer apply. Accordingly, the re-injected packets are forwarded to the egress port 623-4 (or some other port) toward the next hop in accordance with the L2 switching logic of the SDN computer network 600.”). Lin ’400 7:10-23 (“Re-injecting packets that pass inspection consume bandwidth, as the packets will have to be transmitted by the security service 630 to the re-inject port 623-3. For optimization, the SDN switch 620 may be configured to copy packets that are redirected to the security service 630 for inspection. This way, the security service 630 simply has to inform the SDN switch 620 an action to take on packets based on the result of the inspection (see arrow 604). For example, the security service 630 may send an index identifying the packets and an action on how to manipulate the packets. The action may instruct the SDN

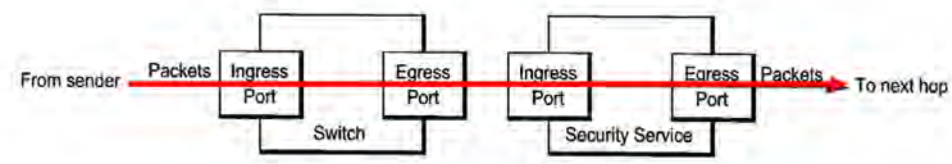
No.	’111 Patent Claim 1	Lin ’400
		switch 620 to drop the copied packets, forward the copied packets to their destinations, quarantine the copied packets, etc.”). Lin ’400 7:39-67 (“In the example of Table 2, the first two rows are bypass rules for bypassing packets coming from or going to a transport control protocol (TCP) port 80. More specifically, hypertext transfer protocol (HTTP) packets, i.e., port 80 packets, that are received in the ingress port with the Ingress_port_ID (i.e., ingress port 623-1) are forwarded directly to the egress port (i.e., egress port 623-4), instead of being redirected to the redirect port 623-2 for inspection by the security service 630. Similarly, HTTP packets received in the egress port with the Egress_port_ID (i.e., egress port 623-4) are forwarded directly to the ingress port 623-1 without being redirected to the security service 630. In the example of Table 2, the bottom two rows are redirect flow rules for forming the SDN pipe between the sender component 622 and the security service 630. Because the bypass flow rules are inserted in the flow tables 621 with higher priority than the redirect flow rules, the bypass flow rules are followed by the SDN switch 620 before the redirect flow rules. Accordingly, HTTP packets are not redirected for inspection by the security service 630. Other packets, i.e., non-HTTP packets, are redirected to the security service 630 per the redirect flow rules. Bypass flow rules and redirect flow rules may be set at different priority levels to meet particular packet inspection needs. The bypass and redirect flow rules also allow for inspection of particular packets, while allowing all other packets to bypass inspection. This is illustrated in the example flow table of Table 3.”).

TABLE 3

IN_PORT	. . .	IP src	TCP src port	TCP dst port	. . .	Action	Count
Ingress_port_ID	*	*	*	80	*	Redirect port	10
Redirect_port_ID	*	*	80	*	*	Ingress port	10
Ingress_port_ID	*	*	*	*	*	Egress port	130
Egress_port_ID	*	*	*	*	*	Ingress port	130

No.	’111 Patent Claim 1	Lin ’400
		Lin ’400 8:10-18 (“In the example of Table 3, the top two rows are redirect flow rules for redirecting HTTP packets to the security service 630 for inspection, while the bottom two rows are bypass flow rules for all packets. Because the redirect flow rules are at higher priority than the bypass flow rules, HTTP packets are sent through the SDN pipe formed in the SDN switch 620 between the sender component 622 and the security service 630. All other packets bypass the SDN pipe, and are accordingly not inspected by the security service 630.”). Lin ’400 Claim 1 (“A software defined networking (SDN) computer network comprising: an SDN switch comprising a plurality of ports that receives network traffic of an SDN computer network, the SDN switch having a first port coupled to a sender component and a second port coupled to a security component, the SDN switch comprising a flow table that comprises a first flow rule to forward a packet received in the first port to the second port and a second flow rule to forward a packet received in the second port to the first port, the SDN switch receiving outgoing packets from the first port and forwarding the outgoing packets to the second port in accordance with the first flow rule, the outgoing packets being sent by the sender component to a destination component; and an SDN controller that controls 7orwardding behavior of the SDN switch and inserts the first and second flow rules into the flow table of the SDN switch, wherein the security component receives the outgoing packets from the second port of the SDN switch, inspects the outgoing packets, and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection, wherein the security component allows the outgoing packets to be forwarded to their destination by instructing the SDN switch to release copies of the outgoing packets.”). Lin ’400 4:8-31 (“The SDN controller 610 provides a logically centralized framework for controlling the behavior of the SDN computer network 600. This is in marked contrast to traditional computer networks where the behavior of the computer network is controlled by low-level device configurations of switches and other network devices. The SDN controller 610 may include a flow policy database 611. The flow policy database 611 may comprise flow policies that are enforced by the controller 610 on network traffic transmitted over the SDN computer network 600. The flow policies may specify security policies that govern transmission of packets over the SDN computer network 600. The flow policies may be enforced in terms of flow rules (labeled as 624) that are stored in the flow tables 621 of the

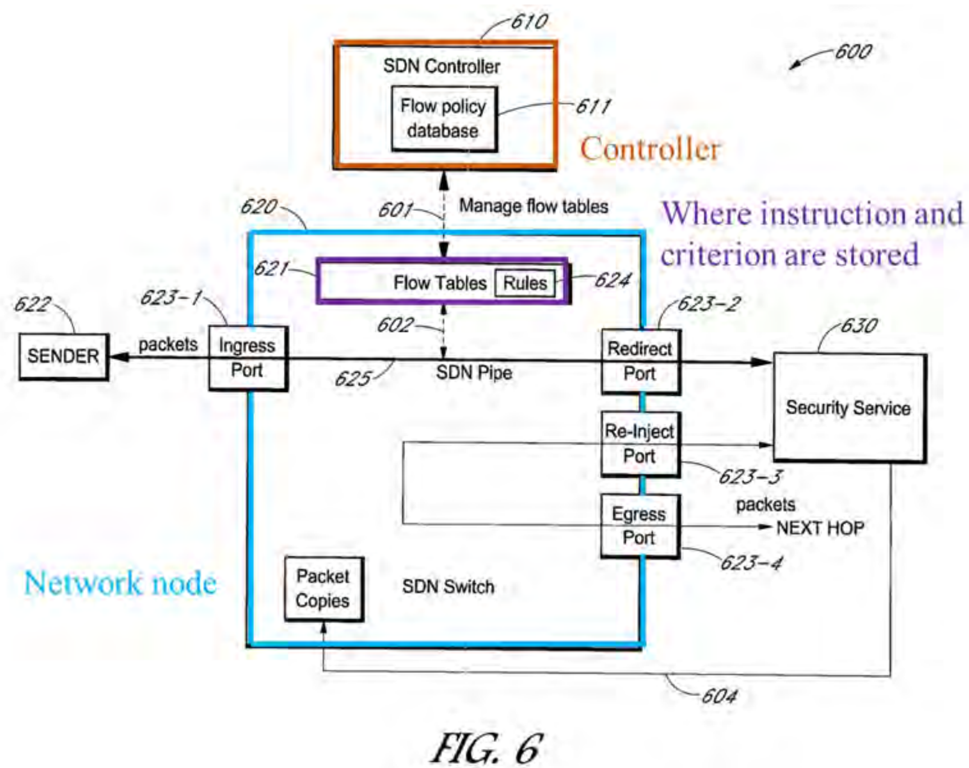
No.	’111 Patent Claim 1	Lin ’400
		SDN switch 620. As a particular example, a flow policy in the flow policy database 611 may indicate inspection of particular packets (e.g., those that meet one or more conditions) by a security service 630. That flow policy may be implemented as a flow rule that forwards the particular packets received in an ingress port 623-1 to the redirect port 623-2 for inspection, for example.”). Lin ’400 6:1-12 (“The SDN controller 610 may insert flow rules in the flow tables 621 (see arrow 601) to create an SDN pipe (labeled as 625) between the sender component 622 and the security service 630. The SDN pipe allows outgoing packets sent by the sender component 622 or incoming packets going to the sender component 622 to be redirected to the security service 630 for inspection before the packets are sent out of the SDN switch 620. In one embodiment, the SDN pipe is created by creating a first flow rule that forwards packets received in the ingress port 623-1 to the redirect port 623-2, and a second flow rule that forwards packets received in the redirect port 623-2 to the ingress port 623-1.”). Lin ’400 3:11-12 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”).

No.	’111 Patent Claim 1	Lin ’400
		 *FIG. 3* Fig. 3 (annotation added)
1[a]	sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion;	Lin ’400 discloses sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion. For example, Lin ’400 identifies a command to determine whether or not a packet requires inspection. Lin ’400 further discloses that its SDN controllers inserts flow rules in a flow table of the SDN switch (which corresponds to the claimed network node) to create an AND pipe between a sender component and a security components, where these flow tables are stored in switches. Lin ’400 1:58-2:4 (“In one embodiment, a software defined networking (SDN) computer network includes an SDN controller and an SDN switch. The SDN controller inserts flow rules in a flow table of the SDN switch to create an SDN pipe between a sender component and a security component. A broadcast function of the SDN switch to the ports that form the SDN pipe may be disabled. The SDN pipe allows outgoing packets sent by the sender component to be received by the security component. The security component inspects the outgoing packets for compliance with security policies and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection. The SDN controller may also insert a flow rule in the flow table of the SDN switch to bypass inspection of specified packets.”).

No.	’111 Patent Claim 1	Lin ’400
		Lin ’400 7:39-8:18 (“In the example of Table 2, the first two rows are bypass rules for bypassing packets coming from or going to a transport control protocol (TCP) port 80. More specifically, hypertext transfer protocol (HTTP) packets, i.e., port 80 packets, that are received in the ingress port with the Ingress_port_ID (i.e., ingress port 623-1) are forwarded directly to the egress port (i.e., egress port 623-4), instead of being redirected to the redirect port 623-2 for inspection by the security service 630. Similarly, HTTP packets received in the egress port with the Egress_port_ID (i.e., egress port 623-4) are forwarded directly to the ingress port 623-1 without being redirected to the security service 630. In the example of Table 2, the bottom two rows are redirect flow rules for forming the SDN pipe between the sender component 622 and the security service 630. Because the bypass flow rules are inserted in the flow tables 621 with higher priority than the redirect flow rules, the bypass flow rules are followed by the SDN switch 620 before the redirect flow rules. Accordingly, HTTP packets are not redirected for inspection by the security service 630. Other packets, i.e., non-HTTP packets, are redirected to the security service 630 per the redirect flow rules. Bypass flow rules and redirect flow rules may be set at different priority levels to meet particular packet inspection needs. The bypass and redirect flow rules also allow for inspection of particular packets, while allowing all other packets to bypass inspection. This is illustrated in the example flow table of Table 3.”). Lin ’400 4:23-31 (“The flow policies may be enforced in terms of flow rules (labeled as 624) that are stored in the flow tables 621 of the SDN switch 620. As a particular example, a flow policy in the flow policy database 611 may indicate inspection of particular packets (e.g., those that meet one or more conditions) by a security service 630. That flow policy may be implemented as a flow rule that forwards the particular packets received in an ingress port 623-1 to the redirect port 623-2 for inspection, for example.”). Lin ’400 5:22-24 (“When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet.”). TABLE 1 IN_PORT · MAC src · MAC dst · IP src · IP dst · . . . · Action · Count

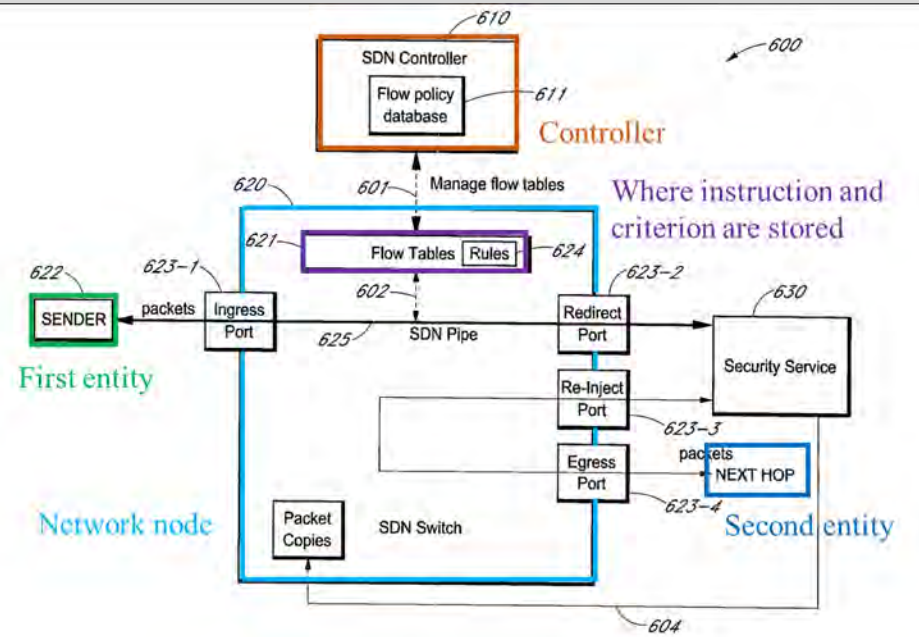
No.	’111 Patent Claim 1	Lin ’400
		Ingress_port_ID * * * * * Redirect port 10 Redirect_port_ID * * * * * Ingress port 10 Lin ’400 5:26-36 (“In the example of Table 1, the first and second rows are redirect flow rules for forming an SDN pipe between the sender component 622 and the security service 630. More specifically, the first row of Table 1 is a flow rule instructing the SDN switch 620 to forward packets received in a port having the Ingress_port_ID (e.g., ingress port 623-1) to the redirect port (e.g., redirect port 623-2). Similarly, the second row of Table 1 is a flow rule instructing the SDN switch 620 to forward packets received in a port having a “Redirect_port_ID” to the ingress port.”). Lin ’400 6:1-12 (“The SDN controller 610 may insert flow rules in the flow tables 621 (see arrow 601) to create an SDN pipe (labeled as 625) between the sender component 622 and the security service 630. The SDN pipe allows outgoing packets sent by the sender component 622 or incoming packets going to the sender component 622 to be redirected to the security service 630 for inspection before the packets are sent out of the SDN switch 620. In one embodiment, the SDN pipe is created by creating a first flow rule that forwards packets received in the ingress port 623-1 to the redirect port 623-2, and a second flow rule that forwards packets received in the redirect port 623-2 to the ingress port 623-1.”). Lin ’400 6:40-54 (“After the redirect flow rules for creating the SDN pipe are inserted in the flow tables 621, any packet received by the SDN switch 620 in the ingress port 623-1 will be identified as to be forwarded to the redirect port 623-2, and any packet received by the SDN switch 620 in the redirect port 623-2 will be identified as to be forwarded to the ingress port 623-1 (see arrow 602). This allows the security service 630 to receive from the redirect port 623-2 all outgoing packets sent by the sender component 622 to the ingress port 623-1. The security service 630 may inspect the outgoing packets for compliance with security policies. The security service 630 may drop, or perform other security response, to packets that do not pass inspection (e.g., packets that do not meet firewall policies, packets containing prohibited payload, packets with malicious content, etc.).”).

No.	’111 Patent Claim 1	Lin ’400
1[b]	receiving, by the network node from the controller, the instruction and the criterion;	Lin ’400 discloses receiving, by the network node from the controller, the instruction and the criterion. For example, Lin ’400 discloses flow rules in a flow table of the SDN switch to create an SDN pipe between a sender component and a security component that are sent to the SDN switches in order to provide instruction to the SDN switches on what packets should be sent to the security component for analysis. Lin ’400 further discloses that its SDN controller inserts flow rules in a flow table of the SDN switch where these flow rules may indicate inspection of particular packets (*e.g.*, those that meet one or more conditions) by a security service. Lin ’400 1:57-2:4 (“In one embodiment, a software defined networking (SDN) computer network includes an SDN controller and an SDN switch. The SDN controller inserts flow rules in a flow table of the SDN switch to create an SDN pipe between a sender component and a security component. A broadcast function of the SDN switch to the ports that form the SDN pipe may be disabled. The SDN pipe allows outgoing packets sent by the sender component to be received by the security component. The security component inspects the outgoing packets for compliance with security policies and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection. The SDN controller may also insert a flow rule in the flow table of the SDN switch to bypass inspection of specified packets.”). Lin ’400 4:23-31 (“The flow policies may be enforced in terms of flow rules (labeled as 624) that are stored in the flow tables 621 of the SDN switch 620. As a particular example, a flow policy in the flow policy database 611 may indicate inspection of particular packets (e.g., those that meet one or more conditions) by a security service 630. That flow policy may be implemented as a flow rule that forwards the particular packets received in an ingress port 623-1 to the redirect port 623-2 for inspection, for example.”). Lin ’400 5:8-12 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule.”).

No.	'111 Patent Claim 1	Lin '400
		Lin '400 6:1-4 ("The SDN controller 610 may insert flow rules in the flow tables 621 (see arrow 601) to create an SDN pipe (labeled as 625) between the sender component 622 and the security service 630. ").  Fig. 6 (annotation added) Lin '400 6:40-41 ("…redirect flow rules for creating the SDN pipe are inserted in the flow tables 621…"). Lin '400 9:10-12 ("…the SDN controller inserts one or more bypass flow rules in the flow table of an SDN switch that is controlled by the SDN controller (step 701)."). *See supra at* 1[a].

No.	'111 Patent Claim 1	Lin '400
1[c]	receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity;	Lin '400 discloses receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity. For example, Lin '400 explains that the SDN switch transports packets from a sender component through an ingress port, out an egress port, and follows the directed address to the "next hop" or destination. Lin '400 1:58-2:4 ("In one embodiment, a software defined networking (SDN) computer network includes an SDN controller and an SDN switch. The SDN controller inserts flow rules in a flow table of the SDN switch to create an SDN pipe between a sender component and a security component. A broadcast function of the SDN switch to the ports that form the SDN pipe may be disabled. The SDN pipe allows outgoing packets sent by the sender component to be received by the security component. The security component inspects the outgoing packets for compliance with security policies and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection. The SDN controller may also insert a flow rule in the flow table of the SDN switch to bypass inspection of specified packets."). Lin '400 3:11-12 ("Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example."). Lin '400 4:33-67 ("The SDN switch 620 may comprise a plurality of ports 623 (i.e., 623-1, 623-2, 623-3, 623-4, etc.). The SDN switch 620 may forward packets from one port 623 to another port 623 in accordance with flow rules in the flow tables 621. In the example of FIG. 6, the port 6231-1 is coupled to a sender component 622. The port 623-1 is referred to as an

No.	’111 Patent Claim 1	Lin ’400
		“ingress port” in that it is a port for receiving outgoing packets sent by the sender component 622. Similarly, the port 623-4 is referred to as an “egress port” in that it is a port for transmitting outgoing packets sent by the sender component 622. It is to be noted that any port 623 may be employed as an “ingress port,” “egress port,” “redirect port,” or “re-inject port.” The aforementioned labels are used herein merely to illustrate processing of packets relative to the sender component 622. Packets going in the opposite direction, i.e., incoming packets that are going to the sender component 622, may be received in the egress port 623-4, forwarded to the re-inject port 623-3, received in the redirect port 623-2, and forwarded to the ingress port 623-1 toward the sender component 622. The SDN switch 620 may comprise one or more flow tables 621. The flow tables 621 may comprise one or more flow rules (labeled as 624) that indicate how to manipulate or process packets that are passing through the SDN switch 620. As a particular example, a flow rule may indicate that a packet received in the ingress port 623-1 is to be forwarded to the redirect port 623-2. Another flow rule may indicate that a packet received in the redirect port 623-2 is to be forwarded to the ingress port 623-1. The just mentioned pair of flow rules are redirect flow rules that create an SDN pipe between the sender component 622 and the security service 630, allowing the security service 630 to inspect packets sent by or going to the sender component 622. Table 1 shows an example flow table with flow rules that create an SDN pipe between the security service 630 and the sender component 622.”).

No.	’111 Patent Claim 1	Lin ’400
		 *FIG. 6* Fig. 6 (annotation added) Lin ’400 Claim 1 (“. A software defined networking (SDN) computer network comprising: an SDN switch comprising a plurality of ports that receives network traffic of an SDN computer network, the SDN switch having a first port coupled to a sender component and a second port coupled to a security component, the SDN switch comprising a flow table that comprises a first flow rule to forward a packet received in the first port to the second port and a second flow rule to forward a packet received in the second port to the first port, the SDN switch receiving outgoing packets from the first port and forwarding the outgoing packets to the second port in accordance with the first flow rule, the outgoing packets being sent by the sender component to a destination component; and an SDN controller that controls forwarding behavior of the SDN switch and inserts the first and second flow rules into the flow table of the SDN switch,

No.	’111 Patent Claim 1	Lin ’400
		wherein the security component receives the outgoing packets from the second port of the SDN switch, inspects the outgoing packets, and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection, wherein the security component allows the outgoing packets to be forwarded to their destination by instructing the SDN switch to release copies of the outgoing packets.”).
1[d]	checking, by the network node, if the packet satisfies the criterion;	Lin ’400 discloses checking, by the network node, if the packet satisfies the criterion. For example, Lin ’400 discloses flow rules that may indicate inspection of particular packets (*e.g.*, those that meet one or more conditions) by a security service, where under the inspection, if the conditions are met, the action indicated in the corresponding “Action” column in the table is performed on the packet. Lin ’400 further discloses that the SDN switch implements bypass flow rules that check whether the packet meets certain criterion, such as identification of HTTP packets, that indicate that the packet should be routed to the destination node instead of the security device. Lin ’400 4:23-31 (“The flow policies may be enforced in terms of flow rules (labeled as 624) that are stored in the flow tables 621 of the SDN switch 620. As a particular example, a flow policy in the flow policy database 611 may indicate inspection of particular packets (e.g., those that meet one or more conditions) by a security service 630. That flow policy may be implemented as a flow rule that forwards the particular packets received in an ingress port 623-1 to the redirect port 623-2 for inspection, for example.”). Lin ’400 5:8-12 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule.”). TABLE 1 IN_PORT | MAC src | MAC dst | IP src | IP dst | . . . | Action | Count Ingress_port_ID | * | * | * | * | * | Redirect port | 10

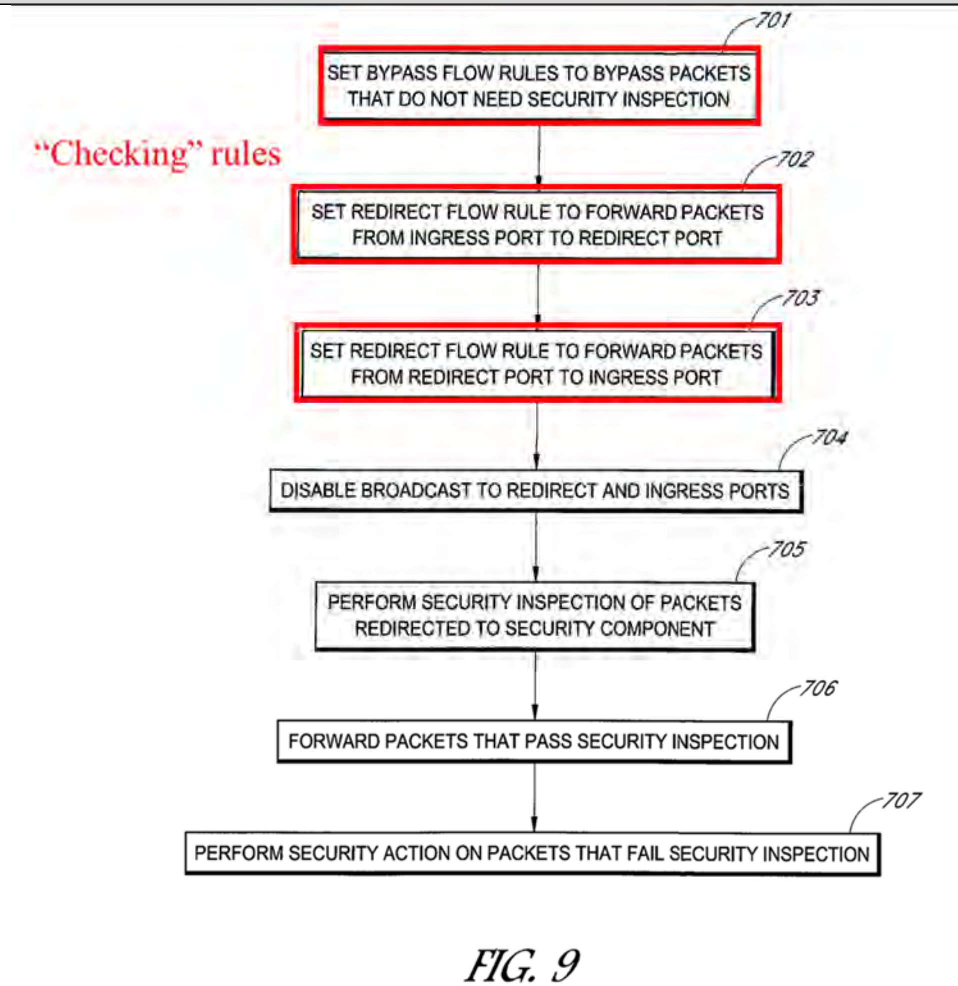
No.	’111 Patent Claim 1	Lin ’400
		Redirect_port_ID * * * * * Ingress port 10 Lin ’400 5:16-21 (“ For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”). Lin ’400 5:22-24 (“When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet.”). Lin ’400 5:26-36 (“In the example of Table 1, the first and second rows are redirect flow rules for forming an SDN pipe between the sender component 622 and the security service 630. More specifically, the first row of Table 1 is a flow rule instructing the SDN switch 620 to forward packets received in a port having the Ingress_port_ID (e.g., ingress port 623-1) to the redirect port (e.g., redirect port 623-2). Similarly, the second row of Table 1 is a flow rule instructing the SDN switch 620 to forward packets received in a port having a “Redirect_port_ID” to the ingress port.”). Lin ’400 6:1-12 (“The SDN controller 610 may insert flow rules in the flow tables 621 (see arrow 601) to create an SDN pipe (labeled as 625) between the sender component 622 and the security service 630. The SDN pipe allows outgoing packets sent by the sender component 622 or incoming packets going to the sender component 622 to be redirected to the security service 630 for inspection before the packets are sent out of the SDN switch 620. In one embodiment, the SDN pipe is created by creating a first flow rule that forwards packets received in the ingress port 623-1 to the redirect port 623-2, and a second flow rule that forwards packets received in the redirect port 623-2 to the ingress port 623-1.”). Lin ’400 6:40-54 (“After the redirect flow rules for creating the SDN pipe are inserted in the flow tables 621, any packet received by the SDN switch 620 in the ingress port 623-1 will be identified as to be forwarded to the redirect port 623-2, and any packet received by the SDN switch 620 in the redirect port 623-2 will be identified as to be forwarded to the ingress

<table>
<tr><th>No.</th><th>’111 Patent Claim 1</th><th>Lin ’400</th></tr>
<tr><td></td><td></td><td>
port 623-1 (see arrow 602). This allows the security service 630 to receive from the redirect port 623-2 all outgoing packets sent by the sender component 622 to the ingress port 623-1. The security service 630 may inspect the outgoing packets for compliance with security policies. The security service 630 may drop, or perform other security response, to packets that do not pass inspection (e.g., packets that do not meet firewall policies, packets containing prohibited payload, packets with malicious content, etc.).”).

Lin ’400 7:24-8:18 (“In one embodiment, bypass flow rules are inserted in the flow tables 621 such that particular packets that do not need to be inspected are not redirected to the security service 630. This embodiment is explained with reference to example flow tables of Tables 2 and 3.

TABLE 2
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Egress port</td><td>120</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>120</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
</table>
TABLE 3
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Egress port</td><td>130</td></tr>
</table>
</td></tr>
</table>

No.	’111 Patent Claim 1	Lin ’400
		Egress_port_ID * * * * * Ingress port 130 Lin ’400 9:10-40 (“In the method of FIG. 9, the SDN controller inserts one or more bypass flow rules in the flow table of an SDN switch that is controlled by the SDN controller (step 701). The bypass flow rules may instruct the SDN switch to forward particular packets directly from one port to another port of the SDN switch without being redirected to a security component, such as a security service, for inspection. The bypass flow rules may be inserted at higher or lower priority than redirect flow rules for creating an SDN pipe that redirects packets to be inspected to the security service. The security service may comprise a physical or virtual machine that provides a security service by inspecting network traffic. In the following two steps (steps 702 and 703), an SDN pipe is created in the SDN switch by inserting redirect flow rules in the flow table of the SDN switch. In one embodiment, the SDN pipe formed by the redirect flow rules allows for interception of packets sent by or transmitted to a virtual machine for inspection by the security service. The SDN controller inserts a first flow rule that instructs the SDN switch to forward packets received in an ingress port to a redirect port (step 702). The ingress port may be a port of the SDN switch that is connected to the virtual machine, and the redirect port may be a port of the SDN switch that is connected to the security service. The SDN controller also inserts a second flow rule that instructs the SDN switch to forward packets received in the redirect port to the egress port (step 703). The SDN controller may also disable the broadcast function of the SDN switch to the ingress port and the redirect port (step 704) to prevent the same broadcast packets to be received multiple times by the virtual machine and the security service”).

No.	'111 Patent Claim 1	Lin '400
		 Fig. 9 (annotation added)
1[e]	responsive to the packet not satisfying the criterion, sending, by the network node over the packet	Lin '400 discloses responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity.

<table>
<tr><th>No.</th><th>’111 Patent Claim 1</th><th>Lin ’400</th></tr>
<tr><td></td><td>network, the packet to the second entity; and</td><td>For example, Lin ’400 discloses that during the checking phase, if a packet does not indicate that port 80 is the source or destination port, then the SDN switch sends the packet over the packet network to its destination node.

Lin ’400 7:24-8:18 (“In one embodiment, bypass flow rules are inserted in the flow tables 621 such that particular packets that do not need to be inspected are not redirected to the security service 630. This embodiment is explained with reference to example flow tables of Tables 2 and 3.

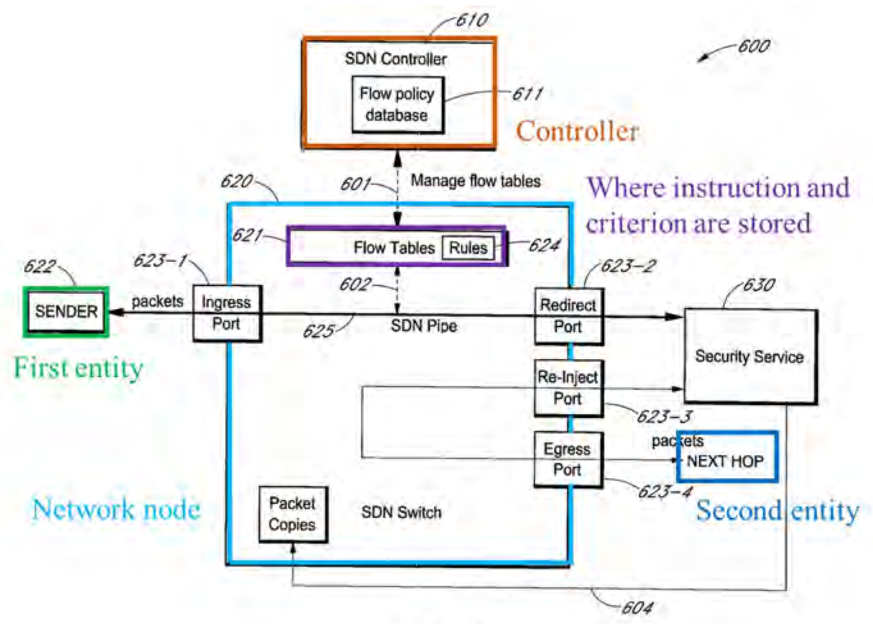
Lin ’400 8:10-18 (“In the example of Table 3, the top two rows are redirect flow rules for redirecting HTTP packets to the security service 630 for inspection, while the bottom two rows are bypass flow rules for all packets. Because the redirect flow rules are at higher priority than the bypass flow rules, HTTP packets are sent through the SDN pipe formed in the SDN switch 620 between the sender component 622 and the security service 630. All other packets bypass the SDN pipe, and are accordingly not inspected by the security service 630.”).

TABLE 3
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Egress port</td><td>130</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>130</td></tr>
</table>

Lin ’400 9:10-40 (“In the method of FIG. 9, the SDN controller inserts one or more bypass flow rules in the flow table of an SDN switch that is controlled by the SDN controller (step 701). The bypass flow rules may instruct the SDN switch to forward particular packets directly from one port to another port of the SDN switch without being redirected to a security component, such as a security service, for inspection. The bypass flow rules may be inserted at higher or lower priority than redirect flow rules for creating an SDN pipe that redirects</td></tr>
</table>

No.	’111 Patent Claim 1	Lin ’400
		packets to be inspected to the security service. The security service may comprise a physical or virtual machine that provides a security service by inspecting network traffic. In the following two steps (steps 702 and 703), an SDN pipe is created in the SDN switch by inserting redirect flow rules in the flow table of the SDN switch. In one embodiment, the SDN pipe formed by the redirect flow rules allows for interception of packets sent by or transmitted to a virtual machine for inspection by the security service. The SDN controller inserts a first flow rule that instructs the SDN switch to forward packets received in an ingress port to a redirect port (step 702). The ingress port may be a port of the SDN switch that is connected to the virtual machine, and the redirect port may be a port of the SDN switch that is connected to the security service. The SDN controller also inserts a second flow rule that instructs the SDN switch to forward packets received in the redirect port to the egress port (step 703). The SDN controller may also disable the broadcast function of the SDN switch to the ingress port and the redirect port (step 704) to prevent the same broadcast packets to be received multiple times by the virtual machine and the security service”).
1[f]	responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity.	Lin ’400 discloses responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity. For example, Lin ’400 teaches that the devices check for a specific packet-applicable criterion, where if a packet satisfies this criterion by indication that port 80 is the s destination port, then the SDN switch sends the packet over the packet network to the security service. Lin ’400 8:10-18 (“In the example of Table 3, the top two rows are redirect flow rules for redirecting HTTP packets to the security service 630 for inspection, while the bottom two rows are bypass flow rules for all packets. Because the redirect flow rules are at higher priority than the bypass flow rules, HTTP packets are sent through the SDN pipe formed in the SDN switch 620 between the sender component 622 and the security service 630. All other packets bypass the SDN pipe, and are accordingly not inspected by the security service 630.”). Lin ’400 1:60-62 (“The SDN controller inserts flow rules in a flow table of the SDN switch to create an SDN pipe between a sender component and a security component.”).

No.	’111 Patent Claim 1	Lin ’400
		Lin ’400 4:8-31 (“The SDN controller 610 provides a logically centralized framework for controlling the behavior of the SDN computer network 600. This is in marked contrast to traditional computer networks where the behavior of the computer network is controlled by low-level device configurations of switches and other network devices. The SDN controller 610 may include a flow policy database 611. The flow policy database 611 may comprise flow policies that are enforced by the controller 610 on network traffic transmitted over the SDN computer network 600. The flow policies may specify security policies that govern transmission of packets over the SDN computer network 600. The flow policies may be enforced in terms of flow rules (labeled as 624) that are stored in the flow tables 621 of the SDN switch 620. As a particular example, a flow policy in the flow policy database 611 may indicate inspection of particular packets (e.g., those that meet one or more conditions) by a security service 630. That flow policy may be implemented as a flow rule that forwards the particular packets received in an ingress port 623-1 to the redirect port 623-2 for inspection, for example.”). Lin ’400 4:53-67 (“The SDN switch 620 may comprise one or more flow tables 621. The flow tables 621 may comprise one or more flow rules (labeled as 624) that indicate how to manipulate or process packets that are passing through the SDN switch 620. As a particular example, a flow rule may indicate that a packet received in the ingress port 623-1 is to be forwarded to the redirect port 623-2. Another flow rule may indicate that a packet received in the redirect port 623-2 is to be forwarded to the ingress port 623-1. The just mentioned pair of flow rules are redirect flow rules that create an SDN pipe between the sender component 622 and the security service 630, allowing the security service 630 to inspect packets sent by or going to the sender component 622. Table 1 shows an example flow table with flow rules that create an SDN pipe between the security service 630 and the sender component 622.”). Lin ’400 6:1-12 (“The SDN controller 610 may insert flow rules in the flow tables 621 (see arrow 601) to create an SDN pipe (labeled as 625) between the sender component 622 and the security service 630. The SDN pipe allows outgoing packets sent by the sender component 622 or incoming packets going to the sender component 622 to be redirected to the security service 630 for inspection before the packets are sent out of the SDN switch 620. In one embodiment, the SDN pipe is created by creating a first flow rule that forwards packets

No.	'111 Patent Claim 1	Lin '400
		received in the ingress port 623-1 to the redirect port 623-2, and a second flow rule that forwards packets received in the redirect port 623-2 to the ingress port 623-1.”).  *FIG. 6* Fig. 6 (annotation added) Lin '400 1:66-2:4 (“The security component inspects the outgoing packets for compliance with security policies and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection. The SDN controller may also insert a flow rule in the flow table of the SDN switch to bypass inspection of specified packets.”). Lin '400 3:21-24 (“The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin '400 6:54-63 (“The security service 630 may forward those packets that pass inspection toward their destination by re-injecting the packets back into the SDN switch 620 by way of

No.	’111 Patent Claim 1	Lin ’400
		the re-inject port 623-3. Once back in the SDN switch 620 by way of the re-inject port 623-3, the flow rules that govern packets received in the ingress port 623-1 and the redirect port 623-2 no longer apply. Accordingly, the re-injected packets are forwarded to the egress port 623-4 (or some other port) toward the next hop in accordance with the L2 switching logic of the SDN computer network 600.”). Lin ’400 7:23-27 (“In one embodiment, bypass flow rules are inserted in the flow tables 621 such that particular packets that do not need to be inspected are not redirected to the security service 630. This embodiment is explained with reference to example flow tables of Tables 2 and 3.”).

No.	’111 Patent Claim 2	Lin ’400
2[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Lin ’400 discloses the method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction. For example, Lin ’400 discloses flow rules to (1) redirecting a packet from its intended destination to a new destination (such as a security service) or (2) making a copy of a packet and sending the copy of the packet to a new destination (such as a security service, as well as a rule to drop packets from the network such that they are no longer forwarded to a destination within the network. Lin further discloses an instruction that, if the packet satisfies the criterion, to send the packet to the security service for inspection. Lin ’400 3:25-33 (“Another way of intercepting network traffic is to mirror the packets to be inspected on a switch that provides vendor specific mirroring application programming interface (API) as shown in FIG. 4. A user may make an API call such that particular packets that enter the ingress port of the switch are redirected or mirrored to the security service by way of a connection tunnel or a mirror port. The security service may forward the redirected or mirrored packets back to an egress port of the switch after inspection.”). Lin ’400 7:10-22 (“Re-injecting packets that pass inspection consume[s] bandwidth, as the packets will have to be transmitted by the security service 630 to the re-inject port 623-3. For optimization, the SDN switch 620 may be configured to copy packets that are redirected to the security service 630 for inspection. This way, the security service 630 simply has to inform

No.	’111 Patent Claim 2	Lin ’400
		the SDN switch 620 an action to take on the packets based on the result of the inspection (see arrow 604). For example, the security service 630 may send an index identifying the packets and an action how to manipulate the packets. The action may instruct the SDN switch 620 to drop the copied packets, forward the copied packets to their destinations, quarantine the copied packets, etc.”). Lin ’400 1:28-32 (“Example packet manipulation actions include forwarding a packet to a specific port, modifying one or more fields of the packet, asking the controller for action to perform on the packet, or dropping the packet.”). Lin ’400 7:19-22 (“The action may instruct the SDN switch 620 to drop the copied packets, forward the copied packets to their destinations, quarantine the copied packets, etc.”). Lin ’400 4:8-31 (“The SDN controller 610 provides a logically centralized framework for controlling the behavior of the SDN computer network 600. This is in marked contrast to traditional computer networks where the behavior of the computer network is controlled by low-level device configurations of switches and other network devices. The SDN controller 610 may include a flow policy database 611. The flow policy database 611 may comprise flow policies that are enforced by the controller 610 on network traffic transmitted over the SDN computer network 600. The flow policies may specify security policies that govern transmission of packets over the SDN computer network 600. The flow policies may be enforced in terms of flow rules (labeled as 624) that are stored in the flow tables 621 of the SDN switch 620. As a particular example, a flow policy in the flow policy database 611 may indicate inspection of particular packets (e.g., those that meet one or more conditions) by a security service 630. That flow policy may be implemented as a flow rule that forwards the particular packets received in an ingress port 623-1 to the redirect port 623-2 for inspection, for example.”). Lin ’400 4:53-67 (“The SDN switch 620 may comprise one or more flow tables 621. The flow tables 621 may comprise one or more flow rules (labeled as 624) that indicate how to manipulate or process packets that are passing through the SDN switch 620. As a particular example, a flow rule may indicate that a packet received in the ingress port 623-1 is to be forwarded to the redirect port 623-2. Another flow rule may indicate that a packet received in the redirect port 623-2 is to be forwarded to the ingress port 623-1. The just mentioned pair

No.	’111 Patent Claim 2	Lin ’400
		of flow rules are redirect flow rules that create an SDN pipe between the sender component 622 and the security service 630, allowing the security service 630 to inspect packets sent by or going to the sender component 622. Table 1 shows an example flow table with flow rules that create an SDN pipe between the security service 630 and the sender component 622.”). Lin ’400 6:1-12 (“The SDN controller 610 may insert flow rules in the flow tables 621 (see arrow 601) to create an SDN pipe (labeled as 625) between the sender component 622 and the security service 630. The SDN pipe allows outgoing packets sent by the sender component 622 or incoming packets going to the sender component 622 to be redirected to the security service 630 for inspection before the packets are sent out of the SDN switch 620. In one embodiment, the SDN pipe is created by creating a first flow rule that forwards packets received in the ingress port 623-1 to the redirect port 623-2, and a second flow rule that forwards packets received in the redirect port 623-2 to the ingress port 623-1.”).
2[b]	upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller.	Lin ’400 discloses upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller. For example, Lin ’400 discloses blocking a packet from being sent to the destination node. If the controller is the destination, the packet would be also be blocked from being sent to the controller. Lin ’400 7:10-22 (“Re-injecting packets that pass inspection consume[s] bandwidth, as the packets will have to be transmitted by the security service 630 to the re-inject port 623-3. For optimization, the SDN switch 620 may be configured to copy packets that are redirected to the security service 630 for inspection. This way, the security service 630 simply has to inform the SDN switch 620 an action to take on the packets based on the result of the inspection (see arrow 604). For example, the security service 630 may send an index identifying the packets and an action how to manipulate the packets. The action may instruct the SDN switch 620 to drop the copied packets, forward the copied packets to their destinations, quarantine the copied packets, etc.”).

No.	’111 Patent Claim 2	Lin ’400
		Lin ’400 1:28-32 (“Example packet manipulation actions include forwarding a packet to a specific port, modifying one or more fields of the packet, asking the controller for action to perform on the packet, or dropping the packet.”). Lin ’400 7:19-22 (“The action may instruct the SDN switch 620 to drop the copied packets, forward the copied packets to their destinations, quarantine the copied packets, etc.”).

No.	’111 Patent Claim 3	Lin ’400
3[a]	The method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction, and	Lin ’400 discloses the method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction. *See supra* Claim 2[a].
3[b]	upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller.	Lin ’400 discloses upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller. For example, Lin ’400 discloses mirroring the packets that enter the ingress port of the switch to continue on to the next hop as well as be sent to the security service. Lin ’400 3:25-33 (“Another way of intercepting network traffic is to mirror the packets to be inspected on a switch that provides vendor specific mirroring application programming interface (API) as shown in FIG. 4. A user may make an API call such that particular packets that enter the ingress port of the switch are redirected or mirrored to the security service by way of a connection tunnel or a mirror port. The security service may forward the redirected or mirrored packets back to an egress port of the switch after inspection.”).

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		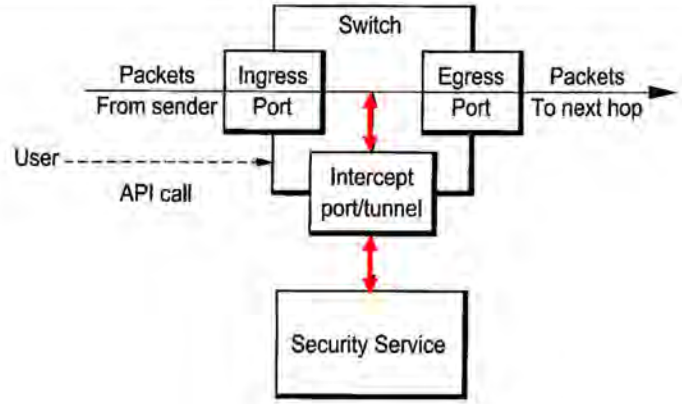 *FIG. 4* Fig. 4 (annotation added)

No.	’111 Patent Claim 4	Lin ’400
4[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Lin ’400 discloses the method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction. *See supra* Claim 2[a].
4[b]	upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by	Lin ’400 discloses upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller. For example, Lin ’400 discloses a command to send a packet to a security service for further inspection upon positive identification. A person of ordinary skill in the art would understand that the security service could be located in the SDN controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, upon receiving by the network

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	the network node, to the controller;	node the 'probe' instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Lin '400 6:40-63 ("After the redirect flow rules for creating the SDN pipe are inserted in the flow tables 621, any packet received by the SDN switch 620 in the ingress port 623-1 will be identified as to be forwarded to the redirect port 623-2, and any packet received by the SDN switch 620 in the redirect port 623-2 will be identified as to be forwarded to the ingress port 623-1 (see arrow 602). This allows the security service 630 to receive from the redirect port 623-2 all outgoing packets sent by the sender component 622 to the ingress port 623-1. The security service 630 may inspect the outgoing packets for compliance with security policies. The security service 630 may drop, or perform other security response, to packets that do not pass inspection (e.g., packets that do not meet firewall policies, packets containing prohibited payload, packets with malicious content, etc.). The security service 630 may forward those packets that pass inspection toward their destination by re-injecting the packets back into the SDN switch 620 by way of the re-inject port 623-3. Once back in the SDN switch 620 by way of the re-inject port 623-3, the flow rules that govern packets received in the ingress port 623-1 and the redirect port 623-2 no longer apply. Accordingly, the re-injected packets are forwarded to the egress port 623-4 (or some other port) toward the next hop in accordance with the L2 switching logic of the SDN computer network 600."). Lin '400 5:45-55 ("The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc."). Lin '400 7:10-22 ("Re-injecting packets that pass inspection consume bandwidth, as the packets will have to be transmitted by the security service 630 to the re-inject port 623-3. For optimization, the SDN switch 620 may be configured to copy packets that are redirected to the security service 630 for inspection. This way, the security service 630 simply has to inform the SDN switch 620 an action to take on packets based on the result of the inspection

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		(see arrow 604). For example, the security service 630 may send an index identifying the packets and an action on how to manipulate the packets. The action may instruct the SDN switch 620 to drop the copied packets, forward the copied packets to their destinations, quarantine the copied packets, etc.”). Lin ’400 8:33-45 (“The security service 630 receives the outgoing packets from the redirect port 623-2 (see arrow 654) and inspects the outgoing packets. After inspection, the security service 630 re-injects the outgoing packets (e.g., outgoing packets that passed inspection) back into the SDN switch 620 by way of the re-inject port 623-3 (see arrow 655). The SDN switch 620 receives the outgoing packets on the re-inject port 623-3. The SDN switch 620 forwards the outgoing packets from the re-inject port 623-3 to the egress port 623-4 in accordance with the L2 switching logic of the SDN computer network 600 (see arrow 657). The outgoing packets exit the SDN switch 620 through the egress port 623-4 (see arrow 658) and move towards their destination.”).

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		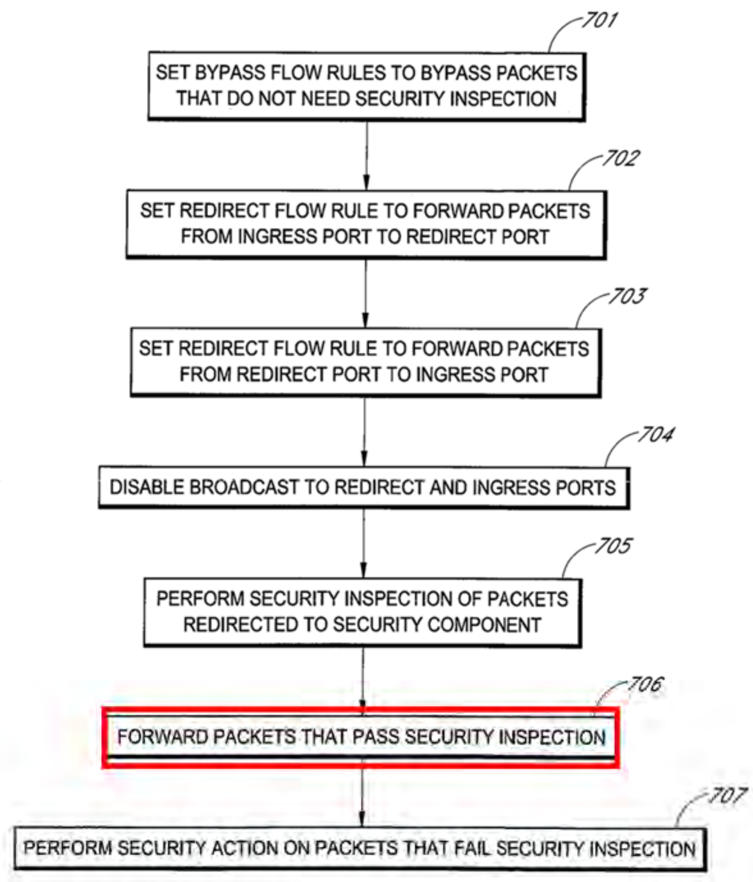 *FIG. 9* Figure 9 (annotation added) Lin ’400 4:53-67 (“The SDN switch 620 may comprise one or more flow tables 621. The flow tables 621 may comprise one or more flow rules (labeled as 624) that indicate how to manipulate or process packets that are passing through the SDN switch 620. As a particular

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		example, a flow rule may indicate that a packet received in the ingress port 623-1 is to be forwarded to the redirect port 623-2. Another flow rule may indicate that a packet received in the redirect port 623-2 is to be forwarded to the ingress port 623-1. The just mentioned pair of flow rules are redirect flow rules that create an SDN pipe between the sender component 622 and the security service 630, allowing the security service 630 to inspect packets sent by or going to the sender component 622. Table 1 shows an example flow table with flow rules that create an SDN pipe between the security service 630 and the sender component 622."). Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Lin '400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses sending the packet from the network element to the controller or another table, in response to the packet matching the action in the flow table. Kempf at [0044] ("FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.")

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		Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are

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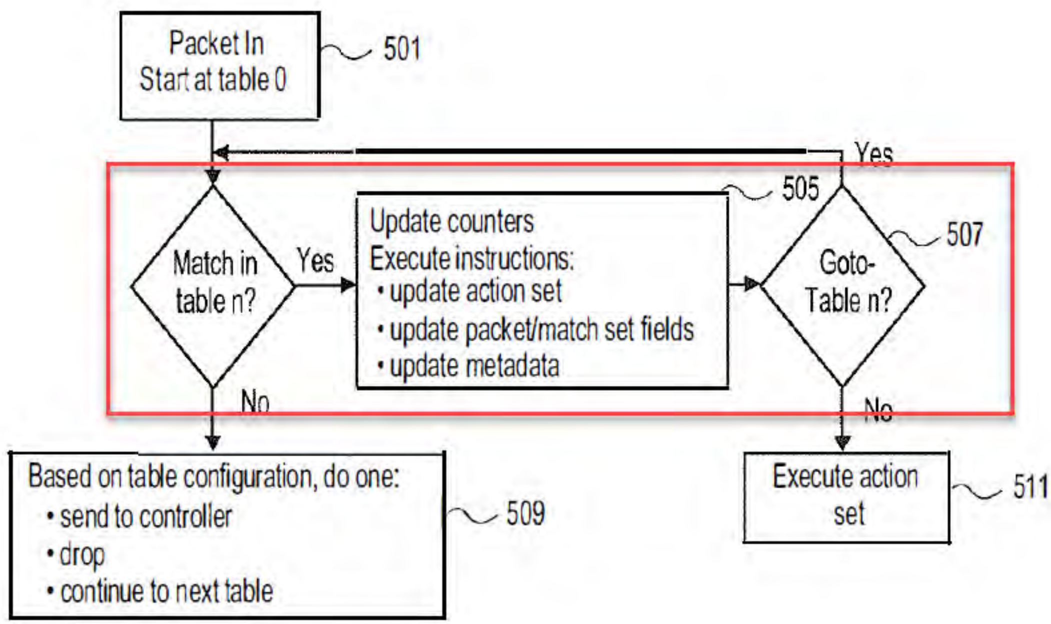
		additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.") Kempf at [0106] ("This encapsulates the packet and sends it to the OpenFlow controller.") Kempf at Figure 5 (annotation added)  FIG. 5 Kempf at Figure 2 (annotation added)

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		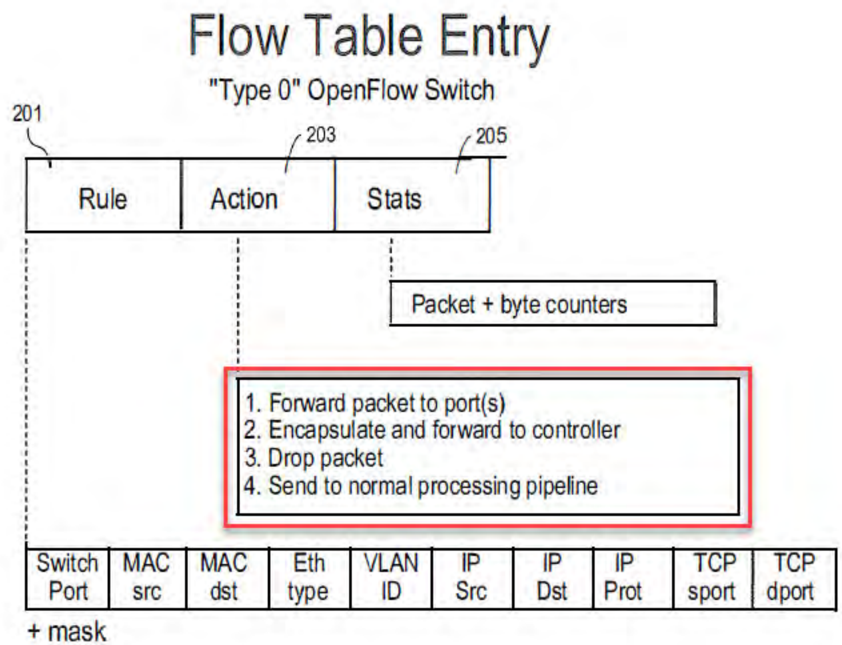 **FIG. 2** For example, Swenson discloses determining by the steering device monitors flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the packet to the network controller. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the

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		steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller

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		140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140

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		contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160.

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		The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

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4[c]	responsive to receiving the packet, analyzing the packet, by the controller;	Lin ’400 discloses responsive to receiving the packet, analyzing the packet, by the controller. For example, Lin ’400 discloses analyzing packets by a security service that inspects the packets. A person of ordinary skill in the art would understand that the security service could be located in the SDN controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, responsive to receiving the packet, analyzing the packet, by the controller would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin ’400 5:37-55 (“The SDN computer network 600 may include a security component in the form of the security service 630. The security service 630 may comprise a virtual machine that provides computer network security services, such as packet inspection, for the sender component 622 and other virtual machines. For example, the security service 630 may comprise a virtual machine with a virtual network interface card that is coupled to the redirect port 623-2 and re-inject port 623-3 of the SDN switch 620. The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc.”).

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		Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4(c) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new

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		flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of "reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow

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		analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”)

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		Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP

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		redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”)

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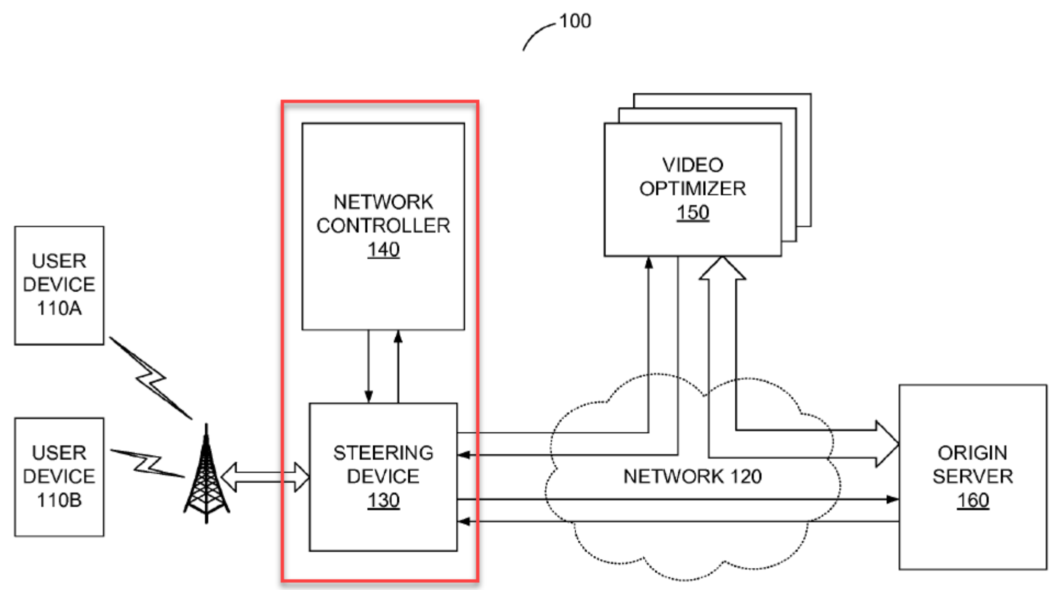
		Swenson at Figure 1 (annotation added)  FIG. 1 Swenson at Figure 4A (annotation added)

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		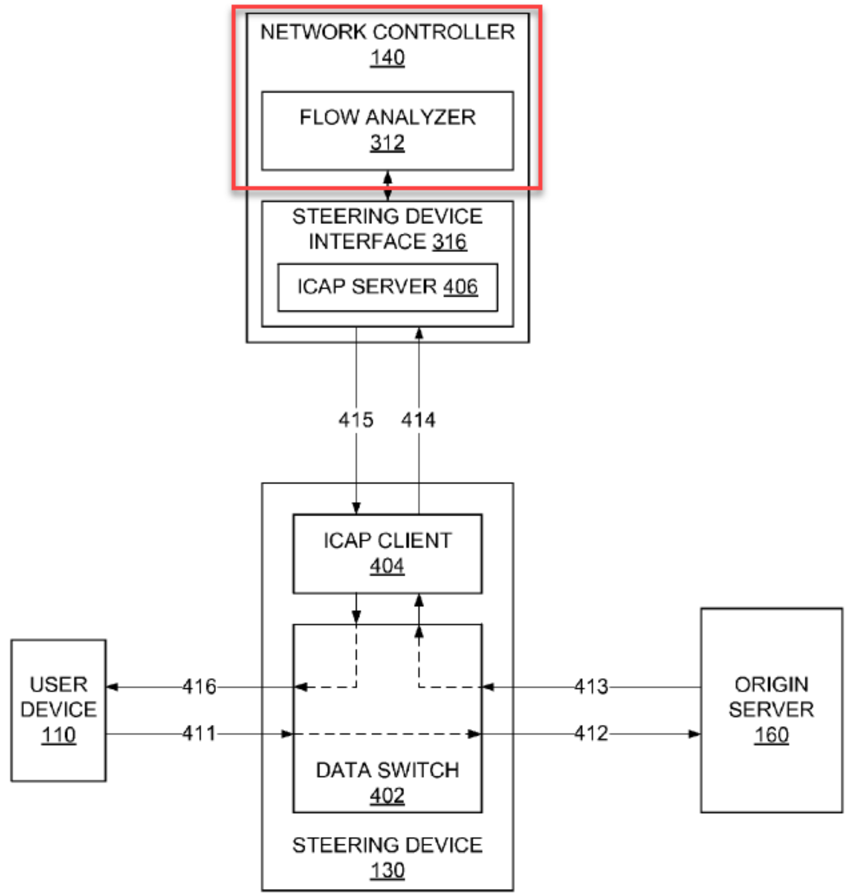 FIG. 4A For example, Copeland discloses analyzing packets received by the intrusion detection engine on the monitoring appliance.

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		Copeland at [0021] (“The present invention provides an accurate and reliable method for detecting network attacks through the use of sampled packet headers that are provided by a source such as that as defined in sFlow and further based in large part on "flows" as opposed to signatures or anomalies. By utilizing the host and flow information structures that are inherent with flow-based analysis and applying rules of statistical significance and analysis, the intrusion detection system can operate with sampled data such as provided by sFlow in order to provide a hybrid solution that combines many of the benefits of a packet capture implementation with the distributed nature of an IDS that operates on Netflow, thus providing an enhanced wide-area IDS solu-tion.”) Copeland at [0023] (“According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.”) Copeland at [0024] (“Generally speaking, the intrusion detection system analyzes network communication traffic for potential detrimental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.”) Copeland at [0027] (“According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow

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		appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.”) Copeland at [0028] (“Generally speaking, the intrusion detection system analyzes network communication traffic for potential detri-mental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.”) Copeland at [0063] (“Consequently, abnormal flows and/or events iden-tified by the intrusion detection engine 155 will raise the concern index (CI) for the associated host. The intrusion detection engine 155 analyzes the data flow between IP devices. However, different types of services have different flow characteristics associated with that service. Therefore, a C/S flow can be determined by the packets exchanged between the two hosts dealing with the same service.”) Copeland at [0065] (“The intrusion detection engine 155 analyzes the flow data 160 to determine if the flow appears to be legitimate traffic or possible suspicious activity. Flows with suspicious activity are assigned a predetermined concern index (CI) value based upon a heuristically predetermined assessment of the significance of the threat of the particular traffic or flow or suspicious activity. The flow concern index values have been derived heuristically from extensive net-work traffic analysis. Concern index values are associated with particular hosts and stored in the host data structure 166 (FIG. 1). Exemplary concern index values for various exemplary flow-based events and other types of events are illustrated in connection with FIGS. 6 and 7.)

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		Copeland at [0069] (“It will now be appreciated that the disclosed meth-odology of intrusion detection is accomplished at least in part by analyzing communication flows to determine if such communications have the flow characteristics of probes or attacks. By analyzing communications for abnormal flow characteristics, attacks can be determined without the need for resource-intensive packet data analysis. A flow can be determined from the packets 101 that are transmitted between two hosts utilizing a single service. The addresses and port numbers of communications are easily discerned by analysis of the header information in a datagram.”) Copeland at [0087] (“As previously stated, the flow-based engine 155 does not analyze the data segments of packets for signature identification. Instead, the engine 155 associates all packets with a flow. It analyzes certain statistical data and assigns a concern index value to abnormal activity. The engine 155 builds a concern index for suspicious hosts by detecting suspicious activities on the network. An alarm is generated when those hosts build enough concern (in the form of a cumulated CI value) to cross the network administrator's predetermined threshold.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0111] (“As shown, the packets exchanged between two hosts associated with a single service can determine a flow. A port number designates a service application that is associated with the particular port. Communications utiliz-ing differing protocols or services provide differing flow characteristics. Consequently, the flow engine 155 analyzes each of the services separately.”)

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		Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”)
4[d]	sending the packet, by the controller, to the network node; and	Lin ’400 discloses sending the packet, by the controller, to the network node. For example, Lin ’400 discloses returning the packet to the switch after analysis. A person of ordinary skill in the art would understand that the security service could be located in the SDN controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, sending the packet, by the controller, to the network node would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin ’400 3:25-33 (“Another way of intercepting network traffic is to mirror the packets to be inspected on a switch that provides vendor specific mirroring application programming interface (API) as shown in FIG. 4. A user may make an API call such that particular packets that enter the ingress port of the switch are redirected or mirrored to the security service by way of a connection tunnel or a mirror port. The security service may forward the redirected or mirrored packets back to an egress port of the switch after inspection.”).

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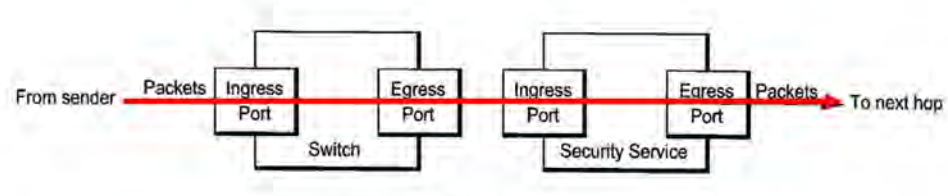
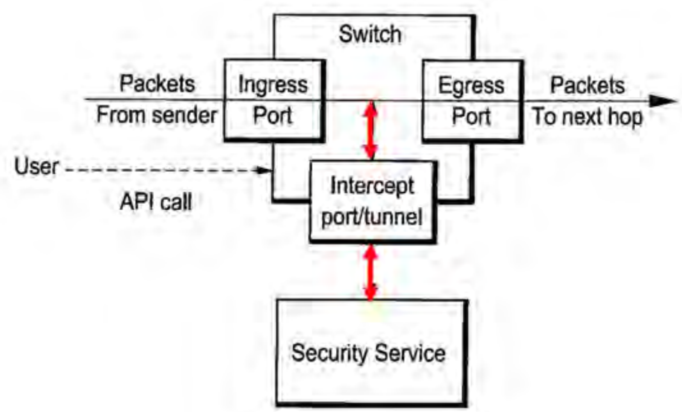
		 *FIG. 3* Fig. 3 (annotation added)  *FIG. 4* Fig. 4 (annotation added) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the

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		references identified in element 4(d) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses sending the packet, for example a video or image, back to the steering device after the network controller analyzes the packet and updates flow statistics. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and

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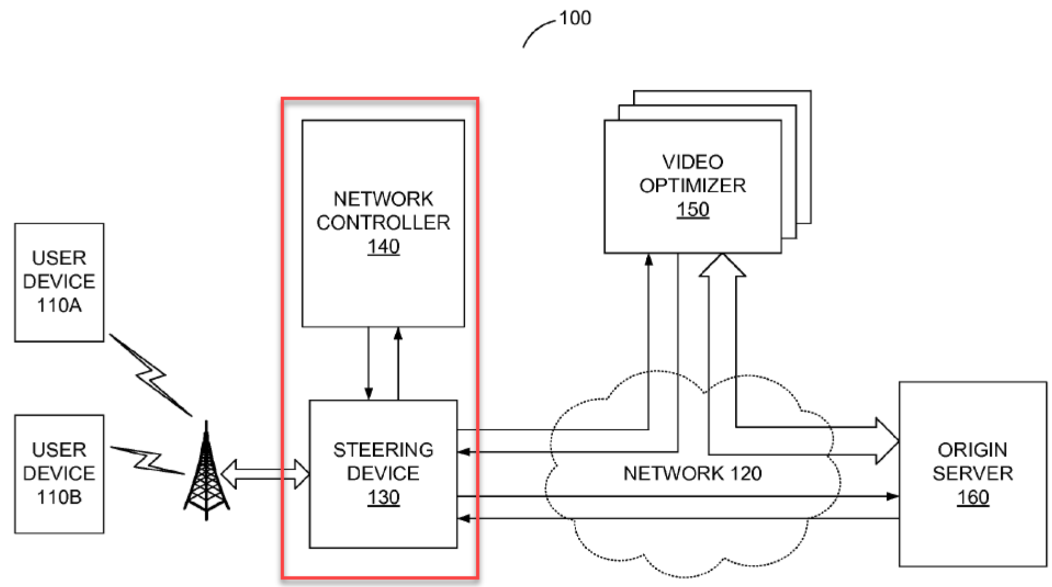
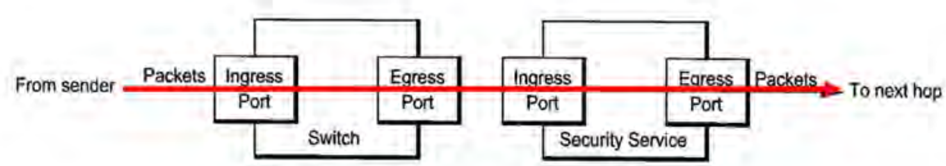
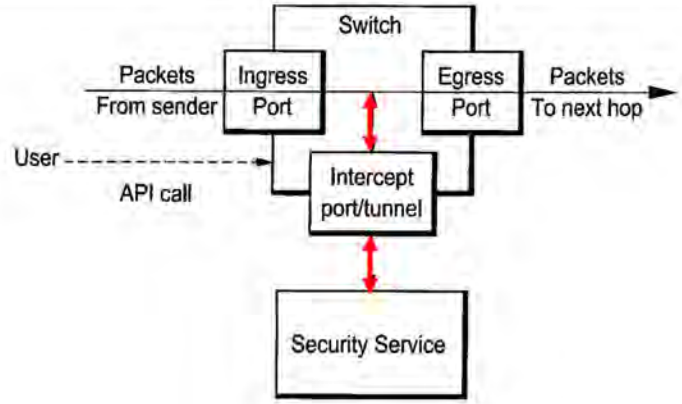
		optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0057] (“The Internet content adaption protocol is a light-weight protocol aimed at executing a simple remote proce-dure call on HTTP messages. ICAP leverages edge-based devices to help deliver value-added services using transparent HTTP proxy caches. Content adaptation refers to performing the particular value added service, such as content manipula-tion or other processing, for the associated HTTP client request/response. ICAP clients pass HTTP messages to ICAP servers for transformation or other processing. In tum, the ICAP server executes its transformation service on the HTTP messages and sends back responses to the ICAP client. At the core of this process is a cache that can proxy all client trans-actions and process them through ICAP servers, which may focus on specific functions, such as ad insertion, virus scan-ning, content translation, language translation, or content fil-tering. ICAP servers, such as those utilized by the network controller 140, handle these tasks to off-load value-added services from network devices including an ICAP client, such as the steering device 130. By offloading value added services from the steering device 130, processing infrastructure (e.g., optimization services and network controllers) may be scaled independent from the steering devices handling raw HTTP throughput.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a

No.	’111 Patent Claim 4	Lin ’400
		portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network

No.	’111 Patent Claim 4	Lin ’400
		controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)  FIG. 1
4[e]	responsive to receiving the packet, sending the packet, by the network node, to the second entity.	Lin ’400 discloses responsive to receiving the packet, sending the packet, by the network node, to the second entity. For example, Lin ’400 discloses that the switch sends the packet to its destination upon receiving the returned packet after inspection by the security service.

No.	'111 Patent Claim 4	Lin '400
		Lin '400 3:11-24 ("Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example."). Lin '400 3:25-33 ("Another way of intercepting network traffic is to mirror the packets to be inspected on a switch that provides vendor specific mirroring application programming interface (API) as shown in FIG. 4. A user may make an API call such that particular packets that enter the ingress port of the switch are redirected or mirrored to the security service by way of a connection tunnel or a mirror port. The security service may forward the redirected or mirrored packets back to an egress port of the switch after inspection.").  *FIG. 3* Fig. 3 (annotation added)

No.	’111 Patent Claim 4	Lin ’400
		 *FIG. 4* Fig. 4 (annotation added)

No.	’111 Patent Claim 5	Lin ’400
5	The method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller.	Lin ’400 discloses the method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller. For example, Lin ’400 discloses a command to send a packet to a security service for further inspection upon positive identification. A person of ordinary skill in the art would understand that the security service could be located in the SDN controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 6:40-63 (“After the redirect flow rules for creating the SDN pipe are inserted in the flow tables 621, any packet received by the SDN switch 620 in the ingress port 623-1 will be

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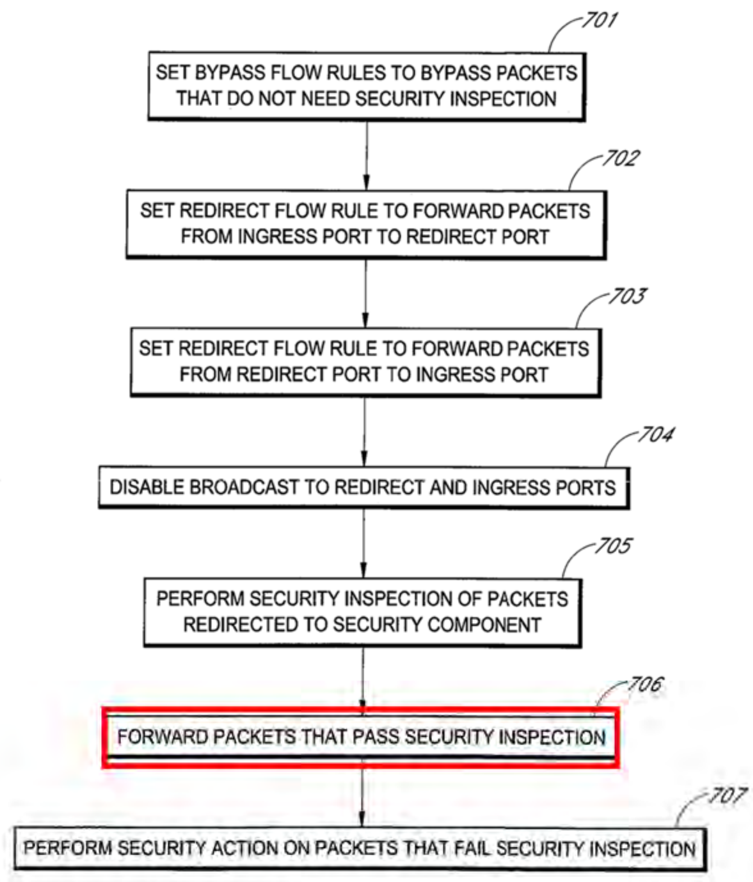
		identified as to be forwarded to the redirect port 623-2, and any packet received by the SDN switch 620 in the redirect port 623-2 will be identified as to be forwarded to the ingress port 623-1 (see arrow 602). This allows the security service 630 to receive from the redirect port 623-2 all outgoing packets sent by the sender component 622 to the ingress port 623-1. The security service 630 may inspect the outgoing packets for compliance with security policies. The security service 630 may drop, or perform other security response, to packets that do not pass inspection (e.g., packets that do not meet firewall policies, packets containing prohibited payload, packets with malicious content, etc.). The security service 630 may forward those packets that pass inspection toward their destination by re-injecting the packets back into the SDN switch 620 by way of the re-inject port 623-3. Once back in the SDN switch 620 by way of the re-inject port 623-3, the flow rules that govern packets received in the ingress port 623-1 and the redirect port 623-2 no longer apply. Accordingly, the re-injected packets are forwarded to the egress port 623-4 (or some other port) toward the next hop in accordance with the L2 switching logic of the SDN computer network 600."). Lin '400 5:45-55 ("The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc."). Lin '400 7:10-22 ("Re-injecting packets that pass inspection consume bandwidth, as the packets will have to be transmitted by the security service 630 to the re-inject port 623-3. For optimization, the SDN switch 620 may be configured to copy packets that are redirected to the security service 630 for inspection. This way, the security service 630 simply has to inform the SDN switch 620 an action to take on packets based on the result of the inspection (see arrow 604). For example, the security service 630 may send an index identifying the packets and an action on how to manipulate the packets. The action may instruct the SDN switch 620 to drop the copied packets, forward the copied packets to their destinations, quarantine the copied packets, etc.").

No.	’111 Patent Claim 5	Lin ’400
		Lin ’400 8:33-45 (“The security service 630 receives the outgoing packets from the redirect port 623-2 (see arrow 654) and inspects the outgoing packets. After inspection, the security service 630 re-injects the outgoing packets (e.g., outgoing packets that passed inspection) back into the SDN switch 620 by way of the re-inject port 623-3 (see arrow 655). The SDN switch 620 receives the outgoing packets on the re-inject port 623-3. The SDN switch 620 forwards the outgoing packets from the re-inject port 623-3 to the egress port 623-4 in accordance with the L2 switching logic of the SDN computer network 600 (see arrow 657). The outgoing packets exit the SDN switch 620 through the egress port 623-4 (see arrow 658) and move towards their destination.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 5 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index. Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.”) Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”)

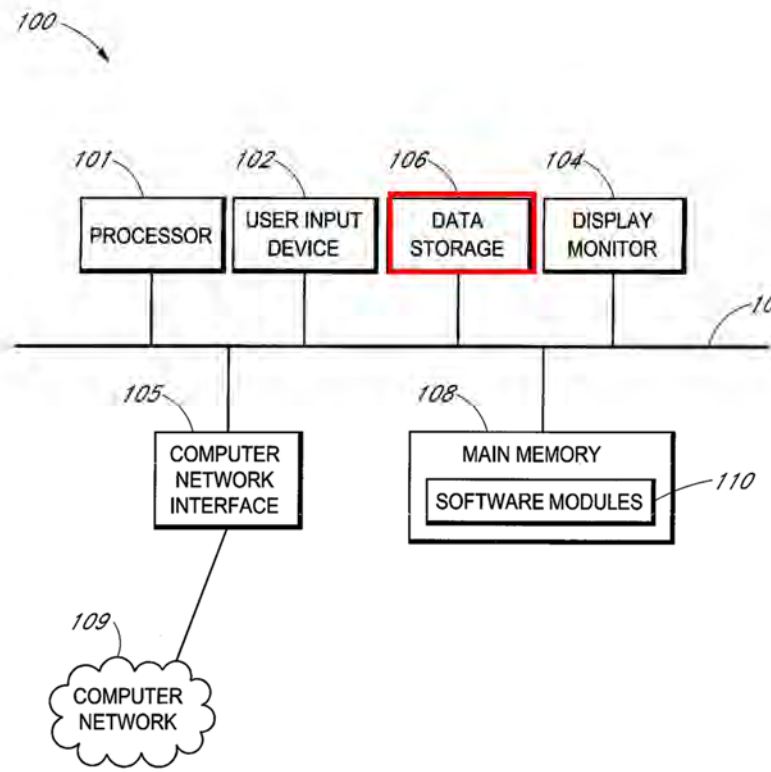
No.	'111 Patent Claim 5	Lin '400
		Copeland at [0097] ("The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.") Copeland at [0120] ("The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled packets, and other information avail-able from the sFlow data stream that may be important. For example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.") Copeland at [0126]-[0129] ("If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).")

No.	’111 Patent Claim 5	Lin ’400
		Copeland at [0144] (“Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”) Copeland at [0159]-[0162] (“A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and: (a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”)

No.	’111 Patent Claim 5	Lin ’400
		 *FIG. 9* Figure 9 (annotation added) Lin ’400 4:53-67 (“The SDN switch 620 may comprise one or more flow tables 621. The flow tables 621 may comprise one or more flow rules (labeled as 624) that indicate how to manipulate or process packets that are passing through the SDN switch 620. As a particular

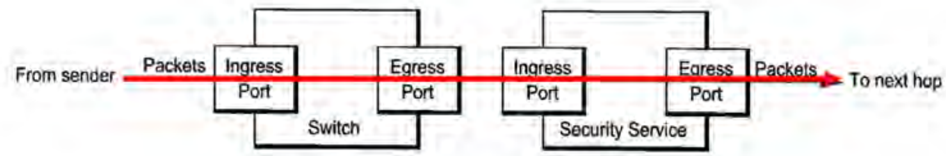
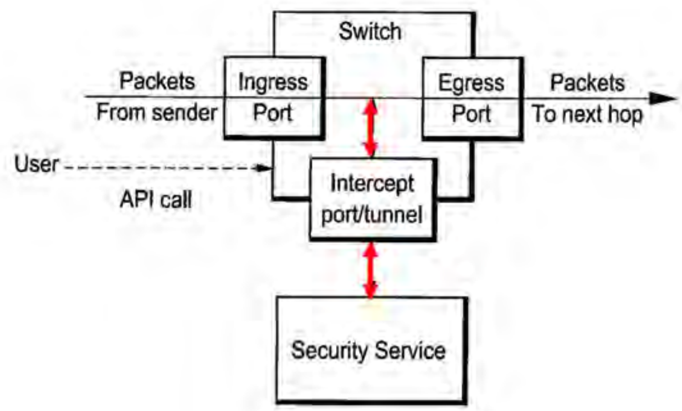
No.	’111 Patent Claim 5	Lin ’400
		example, a flow rule may indicate that a packet received in the ingress port 623-1 is to be forwarded to the redirect port 623-2. Another flow rule may indicate that a packet received in the redirect port 623-2 is to be forwarded to the ingress port 623-1. The just mentioned pair of flow rules are redirect flow rules that create an SDN pipe between the sender component 622 and the security service 630, allowing the security service 630 to inspect packets sent by or going to the sender component 622. Table 1 shows an example flow table with flow rules that create an SDN pipe between the security service 630 and the sender component 622.”).

No.	’111 Patent Claim 6	Lin ’400
6	The method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory.	Lin ’400 discloses the method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory. For example, Lin ’400 discloses a main memory and a data storage device that could be used to store the packet or a portion thereof. Lin ’400 2:47-65 (“FIG. 2 shows a schematic diagram of a computer system 100 that may be employed with embodiments of the present invention. The computer system 100 may be employed as a control plane and/or a data plane, for example. As another example, the computer system 100 may be employed to host a virtualization environment that supports a plurality of virtual machines. The computer system 100 may have fewer or more components to meet the needs of a particular application. The computer system 100 may include one or more processors 101. The computer system 100 may have one or more buses 103 coupling its various components. The computer system 100 may include one or more user input devices 102 (e.g., keyboard, mouse), one or more data storage devices 106 (e.g., hard drive, optical disk, Universal Serial Bus memory), a display monitor 104 (e.g., liquid crystal display, flat panel monitor), a computer network interface 105 (e.g., network adapter, modem), and a main memory 108 (e.g., random access memory). The computer network interface 105 may be coupled to a computer network 109.”) Lin ’400 2:67-3:10 (“The computer system 100 is a particular machine as programmed with software modules 110. The software modules 110 comprise computer-readable program code stored non-transitory in the main memory 108 for execution by the processor 101. The

No.	’111 Patent Claim 6	Lin ’400
		computer system 100 may be configured to perform its functions by executing the software modules 110. The software modules 110 may be loaded from the data storage device 106 to the main memory 108. An article of manufacture may be embodied as computer-readable storage medium including instructions that when executed by a computer causes the computer to be operable to perform the functions of the software modules 110.”)  FIG. 2 Fig. 2 (annotation added)

No.	’111 Patent Claim 7	Lin ’400
7	The method according to claim 5, further comprising responsive	Lin ‘400 discloses the method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.

No.	’111 Patent Claim 7	Lin ’400
	to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.	For example, Lin ’400 discloses a command to send a packet to a security service for further inspection upon positive identification A person of ordinary skill in the art would understand that the security service could be located in the SDN controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, responsive to the packet satisfying the criterion and to instruction, sending a portion of the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 5. Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin ’400 3:25-33 (“Another way of intercepting network traffic is to mirror the packets to be inspected on a switch that provides vendor specific mirroring application programming interface (API) as shown in FIG. 4. A user may make an API call such that particular packets that enter the ingress port of the switch are redirected or mirrored to the security service by way of a connection tunnel or a mirror port. The security service may forward the redirected or mirrored packets back to an egress port of the switch after inspection.”).

No.	’111 Patent Claim 7	Lin ’400
		 FIG. 3 Fig. 3 (annotation added)  FIG. 4 Fig. 4 (annotation added) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 5 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example.

No.	’111 Patent Claim 7	Lin ’400
		For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index. Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.”) Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0120] (“The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled packets, and other information avail-able from the sFlow data stream that may be important. For

No.	’111 Patent Claim 7	Lin ’400
		example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.”) Copeland at [0126]-[0129] (“If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”) Copeland at [0144] (“Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."”)

No.	’111 Patent Claim 7	Lin ’400
		Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”) Copeland at [0159]-[0162] (“A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and: (a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”)

No.	’111 Patent Claim 8	Lin ’400
8[a]	The method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes, and	Lin ’400 discloses the method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes. For example, Lin ’400 discloses particular packets with specific byte counts. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, wherein the portion of the packet consists of multiple consecutive bytes would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 5:8-25 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source

No.	’111 Patent Claim 8	Lin ’400
		of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 8(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses consecutive bytes of a packet header field. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud

No.	’111 Patent Claim 8	Lin ’400
		computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”)

No.	'111 Patent Claim 8	Lin '400
		Kempf at [0092] ("In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.") Kempf at [0098] ("The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.") Kempf at [0101] ("In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)")

No.	’111 Patent Claim 8	Lin ’400
		For example, Copeland discloses fragmenting packets into smaller byte sizes, including headers and flags. Copeland further discloses sending sampled packet headers, consisting of fragmented packets of consecutive bytes to the monitoring device. Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”)
8[b]	wherein the instruction comprises identification of the consecutive bytes in the packet.	Lin ’400 discloses wherein the instruction comprises identification of the consecutive bytes in the packet. For example, Lin ’400 discloses a flow table with a flow rule that indicates particular packets and identifies byte counts. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, wherein the instruction comprises identification of the consecutive bytes in the packet would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 5:8-25 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”).

No.	’111 Patent Claim 8	Lin ’400
		Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 8(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses rules in which the flow table includes matching to the consecutive bytes of a packet header. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU

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		(message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152);

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		and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) For example, Copeland discloses identifying the sampled packet headers comprised of fragmented packets of smaller byte sizes. Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”)

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		Copeland at [0080] (“After the fragmentation information, an 8-bit time to live field specifies the remaining life of a packet and is decremented each time the packet is relayed. If this field is 0, the packet is destroyed. Next is an 8-bit protocol field that specifies the transport protocol used in the data portion. The following 16-bit field is a header checksum on the header only. Finally, the last two fields illustrated contain the 32-bit source address and 32-bit destination address. IP packet data follows the address information.”) Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”)

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9	The method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller.	Lin ’400 the method according to claim 5, further comprising discloses responsive to receiving the packet, analyzing the packet, by the controller. For example, Lin ’400 discloses security service that inspects the packets. A person of ordinary skill in the art would understand that the security service could be located in the SDN controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, responsive to receiving the packet, analyzing the packet, by the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 5. Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path.

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		This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin ’400 5:37-55 (“The SDN computer network 600 may include a security component in the form of the security service 630. The security service 630 may comprise a virtual machine that provides computer network security services, such as packet inspection, for the sender component 622 and other virtual machines. For example, the security service 630 may comprise a virtual machine with a virtual network interface card that is coupled to the redirect port 623-2 and re-inject port 623-3 of the SDN switch 620. The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 9 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device

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		130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0029] ("As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data

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		for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of "reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the

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		flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network

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		controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618.

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		Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)

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		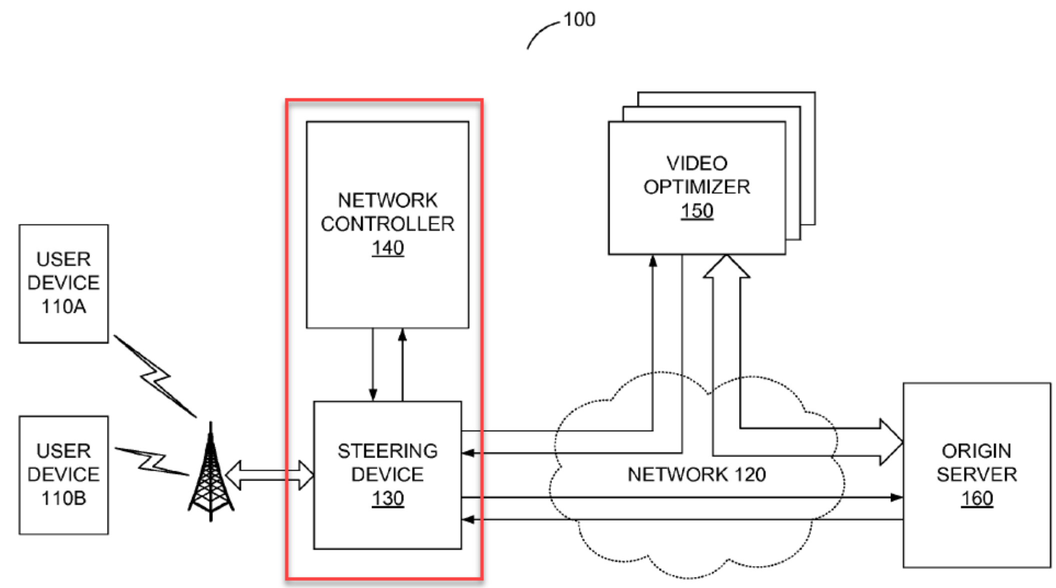 FIG. 1 Swenson at Figure 4A (annotation added)

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		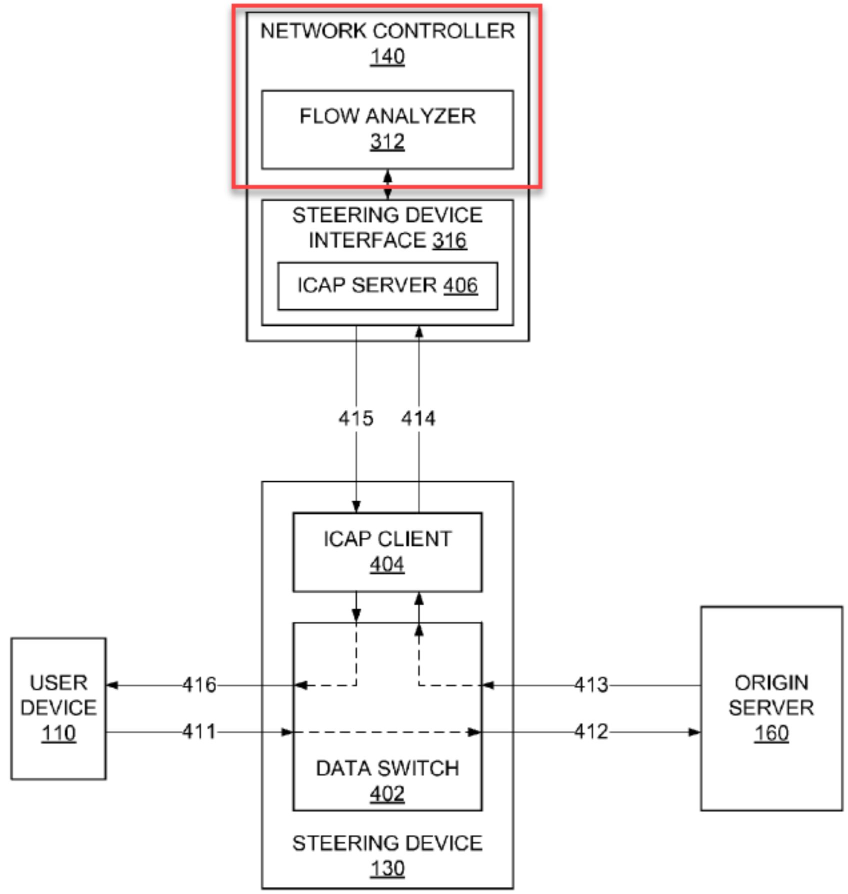 **FIG. 4A** For example, Copeland discloses analyzing packets received by the intrusion detection engine on the monitoring appliance.

No.	’111 Patent Claim 9	Lin ’400
		Copeland at [0021] (“The present invention provides an accurate and reliable method for detecting network attacks through the use of sampled packet headers that are provided by a source such as that as defined in sFlow and further based in large part on "flows" as opposed to signatures or anomalies. By utilizing the host and flow information structures that are inherent with flow-based analysis and applying rules of statistical significance and analysis, the intrusion detection system can operate with sampled data such as provided by sFlow in order to provide a hybrid solution that combines many of the benefits of a packet capture implementation with the distributed nature of an IDS that operates on Netflow, thus providing an enhanced wide-area IDS solu-tion.”) Copeland at [0023] (“According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.”) Copeland at [0024] (“Generally speaking, the intrusion detection system analyzes network communication traffic for potential detrimental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.”) Copeland at [0027] (“According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow

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		appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.”) Copeland at [0028] (“Generally speaking, the intrusion detection system analyzes network communication traffic for potential detri-mental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.”) Copeland at [0063] (“Consequently, abnormal flows and/or events iden-tified by the intrusion detection engine 155 will raise the concern index (CI) for the associated host. The intrusion detection engine 155 analyzes the data flow between IP devices. However, different types of services have different flow characteristics associated with that service. Therefore, a C/S flow can be determined by the packets exchanged between the two hosts dealing with the same service.”) Copeland at [0065] (“The intrusion detection engine 155 analyzes the flow data 160 to determine if the flow appears to be legitimate traffic or possible suspicious activity. Flows with suspicious activity are assigned a predetermined concern index (CI) value based upon a heuristically predetermined assessment of the significance of the threat of the particular traffic or flow or suspicious activity. The flow concern index values have been derived heuristically from extensive net-work traffic analysis. Concern index values are associated with particular hosts and stored in the host data structure 166 (FIG. 1). Exemplary concern index values for various exemplary flow-based events and other types of events are illustrated in connection with FIGS. 6 and 7.)

No.	’111 Patent Claim 9	Lin ’400
		Copeland at [0069] (“It will now be appreciated that the disclosed meth-odology of intrusion detection is accomplished at least in part by analyzing communication flows to determine if such communications have the flow characteristics of probes or attacks. By analyzing communications for abnormal flow characteristics, attacks can be determined without the need for resource-intensive packet data analysis. A flow can be determined from the packets 101 that are transmitted between two hosts utilizing a single service. The addresses and port numbers of communications are easily discerned by analysis of the header information in a datagram.”) Copeland at [0087] (“As previously stated, the flow-based engine 155 does not analyze the data segments of packets for signature identification. Instead, the engine 155 associates all packets with a flow. It analyzes certain statistical data and assigns a concern index value to abnormal activity. The engine 155 builds a concern index for suspicious hosts by detecting suspicious activities on the network. An alarm is generated when those hosts build enough concern (in the form of a cumulated CI value) to cross the network administrator's predetermined threshold.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0111] (“As shown, the packets exchanged between two hosts associated with a single service can determine a flow. A port number designates a service application that is associated with the particular port. Communications utiliz-ing differing protocols or services provide differing flow characteristics. Consequently, the flow engine 155 analyzes each of the services separately.”)

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		Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”)

No.	’111 Patent Claim 12	Lin ’400
12	The method according to claim 9, wherein the analyzing comprises applying security or data analytic application.	Lin ’400 discloses the method according to claim 9, wherein the analyzing comprises applying security or data analytic application. For example, Lin ’400 discloses a security processing function that employs conventional packet inspection algorithms. Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin ’400 5:37-55 (“The SDN computer network 600 may include a security component in the form of the security service 630. The security service 630 may comprise a virtual machine that provides computer network security services, such as packet inspection, for the sender component 622 and other virtual machines. For example, the security service 630 may comprise a virtual machine with a virtual network interface card that is coupled to the redirect port 623-2 and re-inject port 623-3 of the SDN switch 620. The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion

No.	’111 Patent Claim 12	Lin ’400
		detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc.”).

No.	’111 Patent Claim 13	Lin ’400
13	The method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality.	Lin ’400 discloses the method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality. For example, Lin ’400 discloses network security service application, such as a firewall or DPI. Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin ’400 5:37-55 (“The SDN computer network 600 may include a security component in the form of the security service 630. The security service 630 may comprise a virtual machine that provides computer network security services, such as packet inspection, for the sender component 622 and other virtual machines. For example, the security service 630 may comprise a virtual machine with a virtual network interface card that is coupled to the redirect port 623-2 and re-inject port 623-3 of the SDN switch 620. The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion

No.	’111 Patent Claim 13	Lin ’400
		detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc.”).

No.	’111 Patent Claim 14	Lin ’400
14	The method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet.	Lin ’400 discloses the method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet. For example, Lin ’400 discloses a security service on packets which includes deep packet inspection. *See supra* Claim 9. Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”).

No.	’111 Patent Claim 15	Lin ’400
15[a]	The method according to claim 9, wherein the packet comprises distinct header and payload fields, and	Lin ’400 discloses the method according to claim 9, wherein the packet comprises distinct header and payload fields. For example, Lin ’400 discloses flow rules that check the source address and destination address of a packet, which is part of a packet header. Lin ’400 further discloses inspection of

No.	’111 Patent Claim 15	Lin ’400
		packets to determine if a packet payload is prohibited or malicious. A person of ordinary skill in the art would understand that data traffic is made up of packets comprised of header and payload fields. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, wherein the packet comprises distinct header and payload fields would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* Claim 9. Lin ’400 5:8-25 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”). Lin ’400 6:40-54 (“After the redirect flow rules for creating the SDN pipe are inserted in the flow tables 621, any packet received by the SDN switch 620 in the ingress port 623-1 will be identified as to be forwarded to the redirect port 623-2, and any packet received by the SDN switch 620 in the redirect port 623-2 will be identified as to be forwarded to the ingress port 623-1 (see arrow 602). This allows the security service 630 to receive from the redirect port 623-2 all outgoing packets sent by the sender component 622 to the ingress port 623-1. The security service 630 may inspect the outgoing packets for compliance with security policies. The security service 630 may drop, or perform other security response, to packets that do not pass inspection (e.g., packets that do not meet firewall policies, packets containing prohibited payload, packets with malicious content, etc.).”).

No.	’111 Patent Claim 15	Lin ’400
		Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 15(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses packet flows with header and payload fields. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0049] (“The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from

No.	’111 Patent Claim 15	Lin ’400
		HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0064] (Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After

No.	’111 Patent Claim 15	Lin ’400
		updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net- work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request

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		header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0079] (“In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added

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		to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)
15[b]	wherein the analyzing comprises checking part of, or whole of, the payload field.	Lin ’400 discloses wherein the analyzing comprises checking part of, or whole of, the payload field. For example, Lin ’400 discloses inspection of packets to determine if a packet payload is prohibited or malicious. A person of ordinary skill in the art would understand that inspection of packets occurs at the payload field. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, wherein the analyzing comprises checking part of, or whole of, the payload field would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 5:8-25 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet

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		Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”). Lin ’400 6:40-54 (“After the redirect flow rules for creating the SDN pipe are inserted in the flow tables 621, any packet received by the SDN switch 620 in the ingress port 623-1 will be identified as to be forwarded to the redirect port 623-2, and any packet received by the SDN switch 620 in the redirect port 623-2 will be identified as to be forwarded to the ingress port 623-1 (see arrow 602). This allows the security service 630 to receive from the redirect port 623-2 all outgoing packets sent by the sender component 622 to the ingress port 623-1. The security service 630 may inspect the outgoing packets for compliance with security policies. The security service 630 may drop, or perform other security response, to packets that do not pass inspection (e.g., packets that do not meet firewall policies, packets containing prohibited payload, packets with malicious content, etc.).”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 15(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses inspecting the payload of a packet flow. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device

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		130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0040] ("The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.") Swenson at [0049] ("The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.") Swenson at [0061] ("Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over

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		the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0064] (Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net- work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request

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		header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be

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		based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0079] (“In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)

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16[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Lin ’400 discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* Claim 1, 15[a].
16[b]	the header comprises one or more flag bits, and	Lin ’400 discloses the header comprises one or more flag bits. For example, Lin ’400 discloses flow rules that check the source address and destination address of a packet, which is part of a packet header. A person of ordinary skill in the art would understand that header fields can comprise one or more flag bits. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, the header comprises one or more flag bits would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 5:8-25 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action”

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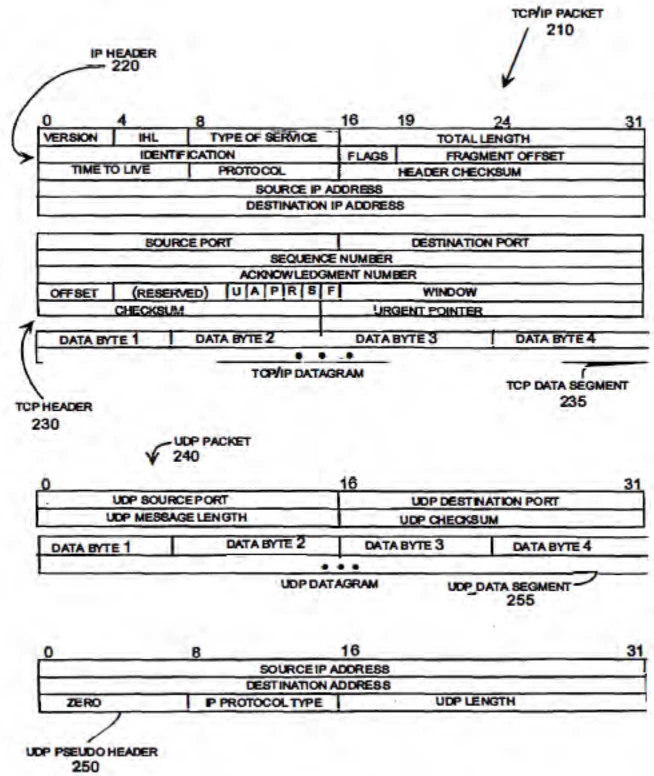
		column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet headers with flag bits. Copeland at Figure 2

No.	'111 Patent Claim 16	Lin '400
		 PACKET HEADERS FIG. 2 Copeland at [0076] ("FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.")

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		Copeland at [0077] (“The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.”) Copeland at [0078] (“In regards to a typical IP packet 210, the first 4 bits of the IP header 220 identify the Internet protocol (IP) version. The following 4 bits identify the IP header length in 32 bit words. The next 8 bits differentiate the type of service by describing how the packet should be handled in transit. The following 16 bits convey the total packet length.”) Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0083] (“Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The

No.	’111 Patent Claim 16	Lin ’400
		checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.”) Copeland at [0116] (“These steps generally require manipulations of quantities such as IP addresses, packet length, header length, start times, end times, port numbers, and other packet related information. Usually, though not necessarily, these quanti-ties take the form of electrical, magnetic, or optical signals capable of being stored, transferred, combined, compared, or otherwise manipulated. It is conventional for those skilled in the art to refer to these signals as bits, bytes, words, values, elements, symbols, characters, terms, numbers, points, records, objects, images, files or the like. It should be kept in mind, however, that these and similar terms should be associated with appropriate quantities for computer opera-tions and that these terms are merely conventional labels applied to quantities that exist within and during operation of the computer.”) As another example, Kempf discloses packet headers with flag bits. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough

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		that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0088] ("To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.") Kempf at [0092] ("In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper

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		two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

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		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_
		teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenFlow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		struct ermst_gtp_mask {
		uint32_t gtp_wildcard;
		uint16_t gtp_flag_mask;
		};
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

16[c]	wherein the packet-applicable criterion is that one or more of the flag bits is set.	Lin ’400 discloses wherein the packet-applicable criterion is that one or more of the flag bits is set. For example, Lin ’400 discloses flow rules that check the source address and destination address of a packet, which is part of a packet header. A person of ordinary skill in the art would understand that header fields can comprise one or more flag bits. A person of ordinary skill in the art would further understand that whether a condition is met in the flow table could depend on whether the one or more flag bits of a header is set. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, wherein the packet applicable criterion is that one or more of the flag bits is set would have been obvious to a person having ordinary skill in the art, as explained below.

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		Lin '400 5:8-25 ("A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the "Action" column indicates an action to take when conditions are met, and the "Count" column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, "IN_PORT", "MAC src" (media access control (MAC) address of the source of the packet), "MAC dst" (MAC address of the destination of the packet), "IP src" (Internet Protocol (IP) address of the source of the packet), "IP dst" (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding "Action" column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition."). Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Lin '400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[c] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet specific characteristics including flag bits that are set. Copeland at [0081] ("In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.") Copeland at [0082] ("Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The

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		ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.") Copeland at [0083] ("Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.") Copeland at [0089] ("FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.") Copeland at [0125] ("For purposes of the description, which follows, the IP address with the lower value, when considered as a 32-bit unsigned integer, is designated ip[0] and the corresponding port number is designated pt[0]. The higher IP address is designated ip[l] and the corresponding TCP or UDP port number is designated pt[l]. At some point, either pt[0] or pt[l] may be designated the "server" port by setting an appropriate bit in a bit map that is part of the flow record (record "state", bit 1 or 2 is set).") Copeland at [0145] ("A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts

No.	’111 Patent Claim 16	Lin ’400
		scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.”) As another example, Kempf flow table matches in which the flag bits is set, Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of

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		mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo

No.	’111 Patent Claim 16	Lin ’400
		Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”) Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenF!ow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:

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```
struct ernst_gtp_mask {
  uint32_t gtp_wildcard;
  uint16_t gtp_flag_mask;
};
```

Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

Kempf at Figure 10

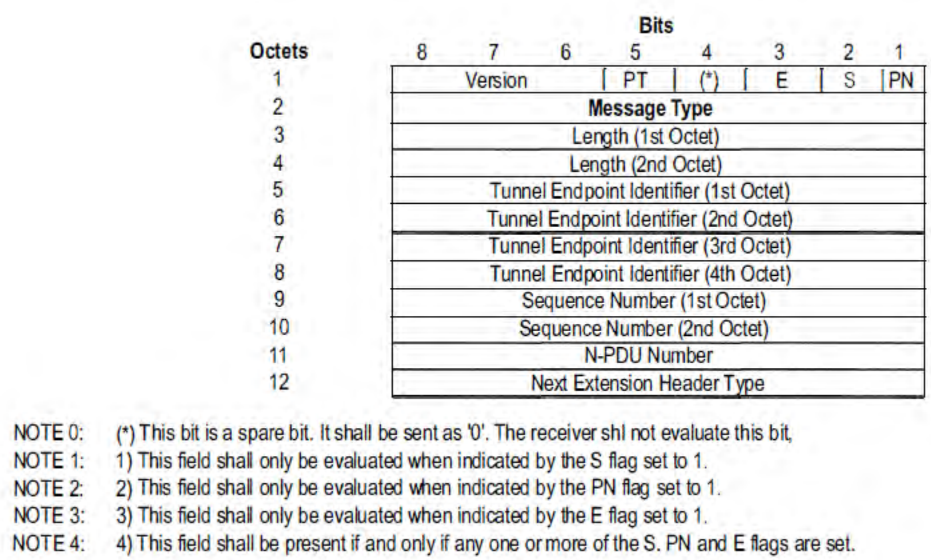

FIG. 10

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<table>
<tr><th>No.</th><th>’111 Patent Claim 17</th><th>Lin ’400</th></tr>
<tr><td>17[a]</td><td>The method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet, and</td><td>Lin ’400 discloses the method according to claim 16, wherein the packet is a Transmission Control Protocol (TCP) packet.

For example, Lin ’400 discloses TCP packets entering and exiting the switch. Lin ’400 further discloses a transport protocol (TCP) port.

TABLE 2
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Egress port</td><td>120</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>120</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
</table>
Lin ’400 7:39-50 (“In the example of Table 2, the first two rows are bypass rules for bypassing packets coming from or going to a transport control protocol (TCP) port 80. More specifically, hypertext transfer protocol (HTTP) packets, i.e., port 80 packets, that are received in the ingress port with the Ingress_port_ID (i.e., ingress port 623-1) are forwarded directly to the egress port (i.e., egress port 623-4), instead of being redirected to the redirect port 623-2 for inspection by the security service 630. Similarly, HTTP packets received in the egress port with the Egress_port_ID (i.e., egress port 623-4) are forwarded directly to the ingress port 623-1 without being redirected to the security service 630.”).</td></tr>
</table>

<table>
<tr><th>No.</th><th>’111 Patent Claim 17</th><th>Lin ’400</th></tr>
<tr><td></td><td></td><td>
TABLE 3
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Egress port</td><td>130</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>130</td></tr>
</table>
Lin ’400 8:10-18 (“In the example of Table 3, the top two rows are redirect flow rules for redirecting HTTP packets to the security service 630 for inspection, while the bottom two rows are bypass flow rules for all packets. Because the redirect flow rules are at higher priority than the bypass flow rules, HTTP packets are sent through the SDN pipe formed in the SDN switch 620 between the sender component 622 and the security service 630. All other packets bypass the SDN pipe, and are accordingly not inspected by the security service 630.
Lin ’400 Claim 8 (“The SDN computer network of claim 7, wherein the specified packets are packets having a particular transport control protocol (TCP) source or destination port.”).
</td></tr>
<tr><td>17[b]</td><td>wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof.</td><td>
Lin ’400 discloses wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof.
For example, Lin ’400 discloses flow rules that check the source address and destination address of a packet, which is part of a packet header. A person of ordinary skill in the art would understand that header fields can comprise one or more flag bits that can comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ‘400 is found to not meet this limitation, wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof would have been obvious to a person having ordinary skill in the art, as explained below.
</td></tr>
</table>

No.	’111 Patent Claim 17	Lin ’400
		Lin ’400 5:8-25 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 17[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses TCP packets with flag bits including SYN, ACK, FIN, and R flag bits. Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted

No.	’111 Patent Claim 17	Lin ’400
		upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”) Copeland at [0090] (“Host2 responds with a SYN-ACK packet. In this message, both the SYN flag and the ACK flag are set. Host2 provides the initial sequence number for its data to Hostl. Host2 also sends to Hostl the acknowledgment number that is the next sequence number Host2 expects to receive from host 1. In the SYN-ACK packet sent by Host2, the acknowl-edgment number is the initial sequence number of Hostl plus 1, which should be the next sequence number received.”) Copeland at [0091] (“Hostl responds to the SYN-ACK with a packet with just the ACK flag set. Hostl acknowledges that the next packet of information received from Host2 will be Host2's initial sequence number plus 1. The three-way handshake is complete and data is transferred.”) Copeland at [0092] (“Host2 responds to ACK packet with its own ACK packet. Host2 acknowledges the data it has received from Hostl by sending an acknowledgment number one greater than its last received data sequence number. Both hosts send packets with the ACK flag set until the session is to end although the P and U flags may also be set, if warranted.”)

No.	'111 Patent Claim 17	Lin '400
		Copeland at [0093] ("As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.") Copeland at [0094] ("Host2 acknowledges the FIN packet by sending its own ACK packet. The ACK packet has the acknowledge-ment number one greater than the sequence number of Hostl's FIN-ACK packet. ACK packets are still delivered between the two hosts, except that HOSTl's packets have no data appended to the TCP/IP end of the headers.") Copeland at [0095] ("When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.") As another example, Uchida discloses the TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag. Uchida at [0040] ("A flow end can be detected by various methods as below. For example, in one method, a protocol end message is checked. For example, in the TCP (Transmission Control Protocol), a FIN flag is checked. In this way, the end of communication, that is, the end of a flow using communica-tion, can be detected. In practice, after a FIN flag, communi-cation with an ACK packet is generated in a reverse-direction flow (a flow in which the source and the destination are reversed). Thus, by detecting the ACK flag in the reverse-direction flow after the FIN packet, a flow end can be deter-mined. Further, since the TCP is used in bidirectional com-munication, the forward- and reverse-direction flows can be used as a pair to determine a flow end. Namely, if the end of a flow is detected, a process rule corresponding to the reverse-direction flow of the flow can also be determined to be unnec-essary. Alternatively, a communication end can also be deter-mined when a predetermined time elapses after reception of a SYN packet and a timeout is determined. Still alternatively, a communication end can be determined by reception of a RST packet. These methods will be described in more detail later as specific examples.")

No.	'111 Patent Claim 17	Lin '400
		Uchida at [0050] ("The flow end check unit can use at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag extracted by the end determination information extraction unit to determine a flow end.") Uchida at [0055] ("In the process rule update method, a flow end can be determined by at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag.") Uchida at [0102] ("Next, specific examples 1 to 3 will be described. In the examples 1 to 3, a flow end is determined by combining features of the above individual exemplary embodiments and using TCP (Transmission Control Protocol) flags.") Uchida at [0103] ("FIG. 6 is a state transition diagram of TCP connec-tion. "CLOSED" at the top of FIG. 6 represents the end of TCP communication, and portions connected thereto repre-sent states prior to the end of TCP communication. Approxi-mately 2MSL (MSL: Maximum Segment Lifetime) is the maximum amount of time required to reach the above "CLOSED," that is, if the packet forwarding apparatus stands by for approximately 2MSL after both FINs flow, the above "CLOSED" is reached. Thus, after a FIN is confirmed in either direction, if this 2MSL elapses, basically, a communi-cation end can be determined. Even if the state does not change smoothly because of packet loss or the like (for example, even if an ACK packet does not arrive after "CLOS-ING"), a retransmitted packet is forwarded immediately after this 2MSL. Thus, the end of TCP communication can be determined if a new FIN packet is not received within the time corresponding to the 2MSL and a margin (2MSL+a) at long-est.") Uchida at [0104] ("Hereinafter, the description will be made, assuming that a packet forwarding apparatus Cl according to the present invention relays TCP communication between a com-puter (client) Dl 0 and a server D20 that use network configu-rations illustrated in FIG. 7. In the example of FIG. 7, the computer Dl0 belongs to a network represented by 192.168. 0./24 and is set by 192.168.0.10. The server D20 belongs to a network represented by 192.168.1./24 and is set by 192.168. 1.10. As in the case of the OpenFlow controller described in Non-Patent Documents 1 and 2, a control apparatus (control-ler) Dl is connected to the packet forwarding apparatus Cl via a dedicated channel and manages connection between the two networks. In the following description, the control appa-ratus (controller) Dl controls the packet forwarding appara-tus Cl so that connection from other

No.	’111 Patent Claim 17	Lin ’400
		networks appears as communication from network number 1 (192.168.1.1) of the respective networks (see process rule actions in FIG. 19). In addition, in the present specific example, since FIN packets are monitored, the end determination information extraction unit Cl 7 monitors a protocol stack, including: fields in which the TCP is determined; and the FIN flag in the TCP header.”) Uchida at [0105] (“FIG. 8 is a flow chart of a flow end determination process using FIN flags. In FIG. 8, steps relating to a timeout determination are added to steps Slll to S116 in the flow chart in FIG. 3. Thus, the flow chart in FIG. 8 includes more detailed steps than the flow chart of FIG. 3. Hereinafter, operations will be described with reference to FIGS. 3, 6, and 8 and FIGS. 9 to 13. In practice, prior to TCP/IP communi-cation, ARP (Address Resolution Protocol) communication is executed, and a process rule may be set in that stage. However, for ease of description, description of the ARP communication will be omitted. The following description will be made based on communication at the TCP/IP level.”) Uchida at [0106] (“First, the computer Dl0 starts communication with the server D20. For an initial establishment of communica-tion, a packet (SYN) is inputted to the packet forwarding apparatus Cl (start of ACTIVE OPEN through SYN forward-ing in FIG. 6). The packet reception unit Cl0 receives and stores this first packet in the packet storage unit Cll (steps SlOl to S102 in FIG. 3).”) Uchida at [0107] (“The packet reception unit C10 notifies the packet process information extraction unit C12 and the end determination information extraction unit C17 of reception of the packet. The packet process information extraction unit C12 refers to the packet storage unit C11 and extracts information such as IP source and destination information that is necessary to search for a process rule (step S103 in FIG. 3). Hereinafter, a process corresponding to steps S103 to S110 in FIG. 3 will be executed.”) Uchida at [0115] (“Upon receiving a notification that the packet has been received by the packet reception unit Cl 0, the end deter-mination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN flag (step S201 in FIG. 8).”)

No.	’111 Patent Claim 17	Lin ’400
		Uchida at [0116] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 1; the source address is 192.168. 0.10; the destination is 192.168.1.10; and the protocol is TCP (the type is Ox0006)) and stands by until forwarding of the packet. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a process rule to be deleted from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule to be deleted represents that the source address is 192.168.1.1; the destination is 192.168.1.1 0; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”) Uchida at [0117] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0121] (“Next, after an ACK reply in response to the FIN packet from the computer DlO is forwarded from the server D20 in the same way as the above normal packet (start of PASSIVE CLOSE in FIG. 6), the server D20 transmits a FIN packet to the computer DlO. When this FIN packet is inputted to the packet forwarding apparatus Cl, the flow end determi-nation process from steps Slll to S116 is started, as in the case of the above start of ACTIVE CLOSE.”) Uchida at [0122] (“Upon receiving a notification that the packet has been received from the packet reception unit Cl0, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN packet (step S201 in FIG. 8).”) Uchida at [0123] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end.

No.	’111 Patent Claim 17	Lin ’400
		Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a modified process rule represents that the source address is 192.168.1. 10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extrac-tion unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”) Uchida at [0124] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203 in FIG. 8). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0125] (“At this point, since a FIN packet has been transmit-ted, the flow end check unit C18 uses the information for identifying a process rule to be deleted as a key, extracts the process rule (process rule corresponding to ingress port 2 in FIG. 11) from the process rule storage unit C13, and marks a FIN packet reception flag (steps S204 to S205 in FIG. 8). This process corresponds to the internal state update process in step S115 in FIG. 3.”) Uchida at [0134] (“Referring back to the state transition diagram of TCP connection in FIG. 6, there are two cases where "CLOSED" at the top of FIG. 6 is reached without a state transition involving FIN flags. One case arises when the ses-sion is closed from SYN_SENT, which is reached when a SYN packet in which a SYN flag is marked is transmitted. The other case arises when a timeout is generated. In such case, while the packet forwarding apparatus cannot monitor the closed session, the packet forwarding apparatus can con-firm a timeout in the following way. In the present specific example, a flow end is determined by this timeout.”)

No.	’111 Patent Claim 17	Lin ’400
		Uchida at [0135] (“n the present specific example, if a SYN/ ACK packet does not flow in a direction opposite to the SYN packet flow direction within a predetermined time (from "SYN_ RCVD" to "SYN_SENT" in FIG. 6), a timeout is determined.”) Uchida at [0136] (“FIG. 14 is a flow chart illustrating a flow end deter-mination process using a SYN flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the dif-ference.”) Uchida at [0137] (“In FIG. 14, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage, unit Cll, monitors a TCP SYN flag, and finds a SYN packet (step S301 in FIG. 14).”) Uchida at [0138] (“Since a SYN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule repre-sents that the source address is 192.168.1.10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the SYN packet has been received and these items of information (step S302 in FIG. 14).”) Uchida at [0139] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether a SYN flag is set in a prede-termined packet header position and an ACK flag is not marked (step S303 in FIG. 14). These steps correspond to steps Slll to S114 in FIG. 3.”)

No.	'111 Patent Claim 17	Lin '400
		Uchida at [0148] (" Next, a third specific example in which a flow end determination is executed by using a TCP RST (reset) flag will be described.") Uchida at [0149] ("Referring back to the state transition diagram of TCP connection in FIG. 6, there is a transition from "SYN_ RCVD," which is a communication establishment standby state, to "LISTEN," which is a communication standby state. A TCP RST (reset) flag signifies release of connection and retry of communication. Namely, since a RST packet in which this RST flag is set signifies invalidation of communi-cation, by detecting this RST flag, a flow end can be deter-mined.") Uchida at [0150] ("FIG. 16 is a first flow chart illustrating a flow end determination process using a RST flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the difference.") Uchida at [0151] ("In FIG. 16, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP RST flag, and finds a RST packet (step S401 in FIG. 16).") Uchida at [0152] ("Since a RST flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the RST packet has been received and these items of information (step S402 in FIG. 16).") Uchida at [0164] ("For example, in a specific example of the present invention, certain TCP flags are monitored. A single packet forwarding apparatus can monitor these flags in a parallel fashion. For example, after a packet that triggers a flow end is detected, the above process may be allowed to branch to the above FIGS. 8, 14, and 16 (17) to realize parallel monitoring.")

No.	'111 Patent Claim 17	Lin '400

No.	'111 Patent Claim 18	Lin '400
18[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Lin '400 discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* Claim 1, 15[a].
18[b]	the header comprises at least the first and second entities addresses in the packet network, and	Lin '400 discloses the header comprises at least the first and second entities addresses in the packet network. For example, Lin '400 discloses flow rules that check the source address and destination address of a packet, which is part of a packet header. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Lin '400 5:8-25 ("A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the "Action" column indicates an action to take when conditions are met, and the "Count" column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, "IN_PORT", "MAC src" (media access control (MAC) address of the source of the packet), "MAC dst" (MAC address of the destination of the packet), "IP src" (Internet Protocol (IP) address of the source of the packet), "IP dst" (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding "Action" column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.").

No.	'111 Patent Claim 18	Lin '400
18[c]	wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses.	Lin '400 discloses wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses. For example, Lin '400 discloses flow rules that check the source address and destination address of a packet, which is part of a packet header. Lin '400 further discloses using source and destination addresses of a packet header to determine whether a packet meets a condition in a flow table. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Lin '400 5:8-25 ("A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the "Action" column indicates an action to take when conditions are met, and the "Count" column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, "IN_PORT", "MAC src" (media access control (MAC) address of the source of the packet), "MAC dst" (MAC address of the destination of the packet), "IP src" (Internet Protocol (IP) address of the source of the packet), "IP dst" (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding "Action" column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.").

No.	'111 Patent Claim 19	Lin '400
19	The method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses.	Lin '400 discloses the method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses. For example, Lin '400 discloses where the conditions include the IP address of the source or destination of the packet. Lin '400 5:8-25 ("A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the "Action" column indicates an action to take when conditions are met, and the "Count" column

No.	’111 Patent Claim 19	Lin ’400
		indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”).

<table>
<tr><th>No.</th><th>’111 Patent Claim 20</th><th>Lin ’400</th></tr>
<tr><td>20[a]</td><td>The method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields, and</td><td>Lin ’400 discloses the method according to claim 1, wherein the packet is a Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields.

For example, Lin ’400 discloses conditions relating to the ingress and egress of TCP packets.

TABLE 2
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Egress port</td><td>120</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>120</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
</table>

Lin ’400 7:39-50 (“In the example of Table 2, the first two rows are bypass rules for bypassing packets coming from or going to a transport control protocol (TCP) port 80. More specifically, hypertext transfer protocol (HTTP) packets, i.e., port 80 packets, that are received in the ingress port with the Ingress_port_ID (i.e., ingress port 623-1) are forwarded directly to the egress port (i.e., egress port 623-4), instead of being redirected to the redirect port 623-2 for</td></tr>
</table>

<table>
<tr><th>No.</th><th>’111 Patent Claim 20</th><th>Lin ’400</th></tr>
<tr><td></td><td></td><td>inspection by the security service 630. Similarly, HTTP packets received in the egress port with the Egress_port_ID (i.e., egress port 623-4) are forwarded directly to the ingress port 623-1 without being redirected to the security service 630.”).

TABLE 3
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Egress port</td><td>130</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>130</td></tr>
</table>
Lin ’400 8:10-18 (“In the example of Table 3, the top two rows are redirect flow rules for redirecting HTTP packets to the security service 630 for inspection, while the bottom two rows are bypass flow rules for all packets. Because the redirect flow rules are at higher priority than the bypass flow rules, HTTP packets are sent through the SDN pipe formed in the SDN switch 620 between the sender component 622 and the security service 630. All other packets bypass the SDN pipe, and are accordingly not inspected by the security service 630.

Lin ’400 Claim 8 (“The SDN computer network of claim 7, wherein the specified packets are packets having a particular transport control protocol (TCP) source or destination port.”).</td></tr>
<tr><td>20[b]</td><td>wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask,</td><td>Lin ’400 discloses wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values.

For example, Lin ’400 discloses flow tables containing matching conditions regarding qualifications for the TCP packets.</td></tr>
</table>

<table>
<tr><th>No.</th><th>’111 Patent Claim 20</th><th>Lin ’400</th></tr>
<tr><td></td><td>or any combination thereof, matches a predetermined value or values.</td><td>

See supra Claim 20[a].

Lin ’400 7:24-27 (“In one embodiment, bypass flow rules are inserted in the flow tables 621 such that particular packets that do not need to be inspected are not redirected to the security service 630. This embodiment is explained with reference to example flow tables of Tables 2 and 3.

TABLE 2

<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Egress port</td><td>120</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>120</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
</table>

Lin ’400 7:39-67 (“In the example of Table 2, the first two rows are bypass rules for bypassing packets coming from or going to a transport control protocol (TCP) port 80. More specifically, hypertext transfer protocol (HTTP) packets, i.e., port 80 packets, that are received in the ingress port with the Ingress_port_ID (i.e., ingress port 623-1) are forwarded directly to the egress port (i.e., egress port 623-4), instead of being redirected to the redirect port 623-2 for inspection by the security service 630. Similarly, HTTP packets received in the egress port with the Egress_port_ID (i.e., egress port 623-4) are forwarded directly to the ingress port 623-1 without being redirected to the security service 630.

In the example of Table 2, the bottom two rows are redirect flow rules for forming the SDN pipe between the sender component 622 and the security service 630. Because the bypass flow rules are inserted in the flow tables 621 with higher priority than the redirect flow rules, the bypass flow rules are followed by the SDN switch 620 before the redirect flow rules. Accordingly, HTTP packets are not redirected for inspection by the security service 630. Other packets, i.e., non-HTTP packets, are redirected to the security service 630 per the redirect flow rules. Bypass flow rules and redirect flow rules may be set at different priority levels to meet particular packet inspection needs.

</td></tr>
</table>

<table>
<tr><th>No.</th><th>’111 Patent Claim 20</th><th>Lin ’400</th></tr>
<tr><td></td><td></td><td>
The bypass and redirect flow rules also allow for inspection of particular packets, while allowing all other packets to bypass inspection. This is illustrated in the example flow table of Table 3.”).

TABLE 3
<table>
<tr><th>IN_PORT</th><th>. . .</th><th>IP src</th><th>TCP src port</th><th>TCP dst port</th><th>. . .</th><th>Action</th><th>Count</th></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>80</td><td>*</td><td>Redirect port</td><td>10</td></tr>
<tr><td>Redirect_port_ID</td><td>*</td><td>*</td><td>80</td><td>*</td><td>*</td><td>Ingress port</td><td>10</td></tr>
<tr><td>Ingress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Egress port</td><td>130</td></tr>
<tr><td>Egress_port_ID</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>Ingress port</td><td>130</td></tr>
</table>

Lin ’400 8:10-18 (“In the example of Table 3, the top two rows are redirect flow rules for redirecting HTTP packets to the security service 630 for inspection, while the bottom two rows are bypass flow rules for all packets. Because the redirect flow rules are at higher priority than the bypass flow rules, HTTP packets are sent through the SDN pipe formed in the SDN switch 620 between the sender component 622 and the security service 630. All other packets bypass the SDN pipe, and are accordingly not inspected by the security service 630.”).

Lin ’400 Claim 8 (“The SDN computer network of claim 7, wherein the specified packets are packets having a particular transport control protocol (TCP) source or destination port.”).
</td></tr>
</table>

No.	’111 Patent Claim 21	Lin ’400
21	The method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network.	Lin ’400 discloses , the method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network. For example, Lin ’400 discloses communicating over a packet network which can comprise of a computer network utilizing the Internet via a network adapter or modem. A person of ordinary skill in the art would understand that a computer network exchanging IP packets would include the Internet. Lin ’400 2:47-65 (“FIG. 2 shows a schematic diagram of a computer system 100 that may be employed with embodiments of the present invention. The computer system 100 may be employed as a control plane and/or a data plane, for example. As another example, the computer system 100 may be employed to host a virtualization environment that supports a plurality of virtual machines. The computer system 100 may have fewer or more components to meet the needs of a particular application. The computer system 100 may include one or more processors 101. The computer system 100 may have one or more buses 103 coupling its various components. The computer system 100 may include one or more user input devices 102 (e.g., keyboard, mouse), one or more data storage devices 106 (e.g., hard drive, optical disk, Universal Serial Bus memory), a display monitor 104 (e.g., liquid crystal display, flat panel monitor), a computer network interface 105 (e.g., network adapter, modem), and a main memory 108 (e.g., random access memory). The computer network interface 105 may be coupled to a computer network 109.”). Lin ’400 at 3:53-64 (“In one embodiment, the SDN computer network 600 is a virtual computer network that allows for transmission of packets from one virtual machine to another. Accordingly, the SDN controller 610 may comprise a virtual OpenFlow controller and the SDN switch 620 may comprise a virtual OpenFlow switch. The SDN computer network 600 may be implemented in a computer system comprising one or more computers that host a virtualization environment. For example, the SDN computer network 600 may be implemented in the Amazon Web Services virtualization environment. The sender component 622 may be a virtual machine in that embodiment.”) Lin ’400 5:8-36 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for

No.	’111 Patent Claim 21	Lin ’400
		statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition. In the example of Table 1, the first and second rows are redirect flow rules for forming an SDN pipe between the sender component 622 and the security service 630. More specifically, the first row of Table 1 is a flow rule instructing the SDN switch 620 to forward packets received in a port having the Ingress_port_ID (e.g., ingress port 623-1) to the redirect port (e.g., redirect port 623-2). Similarly, the second row of Table 1 is a flow rule instructing the SDN switch 620 to forward packets received in a port having a “Redirect_port_ID” to the ingress port.”). Lin ’400 6:1-12 (“The SDN controller 610 may insert flow rules in the flow tables 621 (see arrow 601) to create an SDN pipe (labeled as 625) between the sender component 622 and the security service 630. The SDN pipe allows outgoing packets sent by the sender component 622 or incoming packets going to the sender component 622 to be redirected to the security service 630 for inspection before the packets are sent out of the SDN switch 620. In one embodiment, the SDN pipe is created by creating a first flow rule that forwards packets received in the ingress port 623-1 to the redirect port 623-2, and a second flow rule that forwards packets received in the redirect port 623-2 to the ingress port 623-1.”). Lin ’400 6:40-54 (“After the redirect flow rules for creating the SDN pipe are inserted in the flow tables 621, any packet received by the SDN switch 620 in the ingress port 623-1 will be identified as to be forwarded to the redirect port 623-2, and any packet received by the SDN switch 620 in the redirect port 623-2 will be identified as to be forwarded to the ingress port 623-1 (see arrow 602). This allows the security service 630 to receive from the redirect port 623-2 all outgoing packets sent by the sender component 622 to the ingress port 623-1. The security service 630 may inspect the outgoing packets for compliance with security policies. The security service 630 may drop, or perform other security response, to packets

No.	’111 Patent Claim 21	Lin ’400
		that do not pass inspection (e.g., packets that do not meet firewall policies, packets containing prohibited payload, packets with malicious content, etc.).”). TABLE 1 IN_PORT / MAC src / MAC dst / IP src / IP dst / . . . / Action / Count Ingress_port_ID * * * * * Redirect port 10 Redirect_port_ID * * * * * Ingress port 10

TABLE 1							
IN_PORT	MAC src	MAC dst	IP src	IP dst	. . .	Action	Count
Ingress_port_ID	*	*	*	*	*	Redirect port	10
Redirect_port_ID	*	*	*	*	*	Ingress port	10

No.	’111 Patent Claim 22	Lin ’400
22	The method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device.	Lin ’400 discloses the method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device. For example, Lin ’400 discloses a sender component and a destination component. Lin ’400 further discloses that the sender component can be a sender computer. A person of ordinary skill in the art would understand that a destination component can be a server device. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Lin ’400 is found to not meet this limitation, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device would have been obvious to a person having ordinary skill in the art, as explained below. Lin ’400 at 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the Security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a Switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, Such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward

No.	’111 Patent Claim 22	Lin ’400
		the next hop, which may be another Switch or a destination component (e.g., destination computer), for example.”) Lin ’400 at 3:53-64 (“In one embodiment, the SDN computer network 600 is a virtual computer network that allows for transmission of packets from one virtual machine to another. Accordingly, the SDN controller 610 may comprise a virtual OpenFlow controller and the SDN switch 620 may comprise a virtual OpenFlow switch. The SDN computer network 600 may be implemented in a computer system comprising one or more computers that host a virtualization environment. For example, the SDN computer network 600 may be implemented in the Amazon Web Services virtualization environment. The sender component 622 may be a virtual machine in that embodiment.”) Lin ’400 5:37-55 (“The SDN computer network 600 may include a security component in the form of the security service 630. The security service 630 may comprise a virtual machine that provides computer network security services, such as packet inspection, for the sender component 622 and other virtual machines. For example, the security service 630 may comprise a virtual machine with a virtual network interface card that is coupled to the redirect port 623-2 and re-inject port 623-3 of the SDN switch 620. The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc.”). Lin ’400 8:18-45 (“FIG. 7 schematically illustrates inspection of outgoing packets sent by the sender component 622 in the SDN computer network 600 in accordance with an embodiment of the present invention. In the example of FIG. 7, the sender component 622 (e.g., a virtual machine, a laptop computer, desktop computer, etc.) transmits outgoing packets to the ingress port 623-1 (see arrow 651). The SDN switch 620 receives the outgoing packets in the ingress port 623-1 and follows a flow rule that pertains to the outgoing packets (see arrow 652). In the example of FIG. 7, a redirect flow rule dictates that packets received by the SDN switch 620 in the ingress port 623-1 are to be forwarded to the redirect port 623-2.

No.	’111 Patent Claim 22	Lin ’400
		Accordingly, the SDN switch 620 forwards the outgoing packets to the redirect port 623-2 (see arrow 653), which is connected to the security service 630 (e.g., a virtual machine, server computer, appliance, etc.). The security service 630 receives the outgoing packets from the redirect port 623-2 (see arrow 654) and inspects the outgoing packets. After inspection, the security service 630 re-injects the outgoing packets (e.g., outgoing packets that passed inspection) back into the SDN switch 620 by way of the re-inject port 623-3 (see arrow 655). The SDN switch 620 receives the outgoing packets on the re-inject port 623-3. The SDN switch 620 forwards the outgoing packets from the re-inject port 623-3 to the egress port 623-4 in accordance with the L2 switching logic of the SDN computer network 600 (see arrow 657). The outgoing packets exit the SDN switch 620 through the egress port 623-4 (see arrow 658) and move towards their destination.” Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 22 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses a user device and an origin server. *See supra* at Claim 1. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”)

No.	'111 Patent Claim 22	Lin '400
		Swenson at [0030] ("The video optimizer 150 is a computer server that provides video and image optimization and delivers opti-mized video and image content to the user devices 110 via the network 120. The video and image optimization is an on-demand service provided through the transcoding of the video and image content. For example, when a user device attempts to retrieve video from the origin server 160, the network controller 140 may decide that the flow meets certain criteria for content optimization. The network controller 140 then redirected the user devices 110 to the video optimizer 150 to retrieve the optimized content. The video optimizer 150 receives information in the redirect request from the user devices 110 or from the network controller 140 about the video or image content to be optimized and retrieve the video or image content from the corresponding origin server 160 for optimization and subsequent delivery to the user devices 110.") Swenson at [0032] ("The video optimizer 150 and the origin server 160 are typically formed of one or more computers. While only one server of each video optimizer 150 and origin server 160 is shown in the environment 100 of FIG. 1, different embodi-ments may include multiple web servers and video servers operated by a single entity or multiple entities. In other embodiments, a single server may also provide different func-tionalities, such as delivering web content as a web server, as well as serving optimized video content.") Swenson at [0034] ("The machine may be a server computer, a client computer, a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a cellular tele-phone, a smart phone, a web appliance, a network router, switch or bridge, or any machine capable of executing instructions 224 (sequential or otherwise) that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute instructions 224 to perform any one or more of the methodologies discussed herein.") Swenson at [0055] ("The video optimizer redirector 318 generates a redi-rect request to a URL pointing to the video optimizer 150 if the video is deemed to be transcoded. In one embodiment, the URL may contain at least one of a video resolution, a video bit rate, a video frame rate divisor, an audio sample rate and number of channels, an audio bit rate, a source URL, a user agent of a client, a source domain cookie and any other authentication data by the video optimizer 150. The video optimizer redirector 318 rewrites the original response with the HTTP redirect and sets the location header to the new URL. This causes the user

No.	'111 Patent Claim 22	Lin '400
		devices 110 to issue a new request to the video optimizer 150. The video optimizer redirector 318 also has the logic to look for incoming URLs generated by itself so that they are not intercepted again.") Swenson at [0058] ("Referring now to FIG. 4A, network traffic flows from the user device 110 through the steering device 130 and arrive at the origin server 160 over the network request path. For example, a browser on the user device 110 may request web content from the origin server 160. A HTTP request message initiated at the user device 110 is forwarded to the steering device 130 over the network link 411. A data switch 402 inside the steering device 130 then relays the request message to the origin server 160 over the network link 412. On the opposite direction, network traffic originated from the origin server 160 flows through the steering device 130 back to the user device 110 over the network response path. For example, the origin server 160 responds to the user request by sending web content over the network link 413 to the steering device 130, which forwards the web content to the user device 110 over the network link 416. Note that the network links 411 and 416 are two opposite directions on the same physical link, so are the network link pair 414 and 415. On the other hand, the network link pair 412 and 413 may or may not share the same network path because traffic between the steering device 130 and origin server 160 on opposite directions may be routed differently over one or more routers.") Swenson at [0070] ("Once the user device 110 receives the HTTP redirect request 620, the user device 110 sends the request over the network to the video optimizer 150. In one embodiment, the network controller 140 monitors the traffic and/or requests from the client device 110 as the HTTP redirect request 620 is routed to the video optimizer 150. In such a configuration, the video optimizer 150 only sees requests for video files that need to be transcoded (i.e., optimized) and are associated with a HTTP redirect request 620. As such, the video optimizer 150 is not burdened with all the requests generated by a user device 110.") Swenson at [0095] ("Certain embodiments are described herein as including logic or a number of components, modules, or mechanisms. Modules may constitute either software mod-ules (e.g., code embodied on a machine-readable medium or in a transmission signal) or hardware modules. A hardware module is tangible unit capable of performing certain opera-tions and may be configured or arranged in a certain manner. In example embodiments, one or more computer systems (e.g., a standalone, client or server computer system) or one or more

No.	'111 Patent Claim 22	Lin '400
		hardware modules of a computer system (e.g., a pro-cessor or a group of processors 102) may be configured by software (e.g., an application or application portion) as a hardware module that operates to perform certain operations as described herein.")

No.	'111 Patent Claim 23	Lin '400
23[a]	The method according to claim 22, wherein the server device comprises a web server, and	Lin '400 discloses the method according to claim 22, wherein the server device comprises a web server. For example, Lin '400 discloses a sender component and a destination component. Lin '400 further discloses that the sender component can be a sender computer. A person of ordinary skill in the art would understand that a destination component can be a web server. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Lin '400 is found to not meet this limitation, wherein the server device comprises a web server would have been obvious to a person having ordinary skill in the art, as explained below. Lin '400 at 3:11-24 ("Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the Security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a Switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, Such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another Switch or a destination component (e.g., destination computer), for example.") Lin '400 at 3:53-64 ("In one embodiment, the SDN computer network 600 is a virtual computer network that allows for transmission of packets from one virtual machine to another. Accordingly, the SDN controller 610 may comprise a virtual OpenFlow controller and the SDN switch 620 may comprise a virtual OpenFlow switch. The SDN computer network 600

No.	'111 Patent Claim 23	Lin '400
		may be implemented in a computer system comprising one or more computers that host a virtualization environment. For example, the SDN computer network 600 may be implemented in the Amazon Web Services virtualization environment. The sender component 622 may be a virtual machine in that embodiment.") Lin '400 5:37-55 ("The SDN computer network 600 may include a security component in the form of the security service 630. The security service 630 may comprise a virtual machine that provides computer network security services, such as packet inspection, for the sender component 622 and other virtual machines. For example, the security service 630 may comprise a virtual machine with a virtual network interface card that is coupled to the redirect port 623-2 and re-inject port 623-3 of the SDN switch 620. The security service 630 may inspect packets for compliance/non-compliance with security policies, such as for presence of malicious code, compliance with firewall rules and access control lists, network intrusion detection, and other computer network security services. The security service 630 may employ conventional packet inspection algorithms. The security service 630 may comprise the Trend Micro Deep Security™ service, for example. The security service 630 may also comprise a physical machine, e.g., a server computer, an appliance, a gateway computer, etc."). Lin '400 8:18-45 ("FIG. 7 schematically illustrates inspection of outgoing packets sent by the sender component 622 in the SDN computer network 600 in accordance with an embodiment of the present invention. In the example of FIG. 7, the sender component 622 (e.g., a virtual machine, a laptop computer, desktop computer, etc.) transmits outgoing packets to the ingress port 623-1 (see arrow 651). The SDN switch 620 receives the outgoing packets in the ingress port 623-1 and follows a flow rule that pertains to the outgoing packets (see arrow 652). In the example of FIG. 7, a redirect flow rule dictates that packets received by the SDN switch 620 in the ingress port 623-1 are to be forwarded to the redirect port 623-2. Accordingly, the SDN switch 620 forwards the outgoing packets to the redirect port 623-2 (see arrow 653), which is connected to the security service 630 (e.g., a virtual machine, server computer, appliance, etc.). The security service 630 receives the outgoing packets from the redirect port 623-2 (see arrow 654) and inspects the outgoing packets. After inspection, the security service 630 re-injects the outgoing packets (e.g., outgoing packets that passed inspection) back into the SDN switch 620 by way of the re-inject port 623-3 (see arrow 655). The SDN switch 620 receives the outgoing packets on the re-inject port 623-3. The SDN

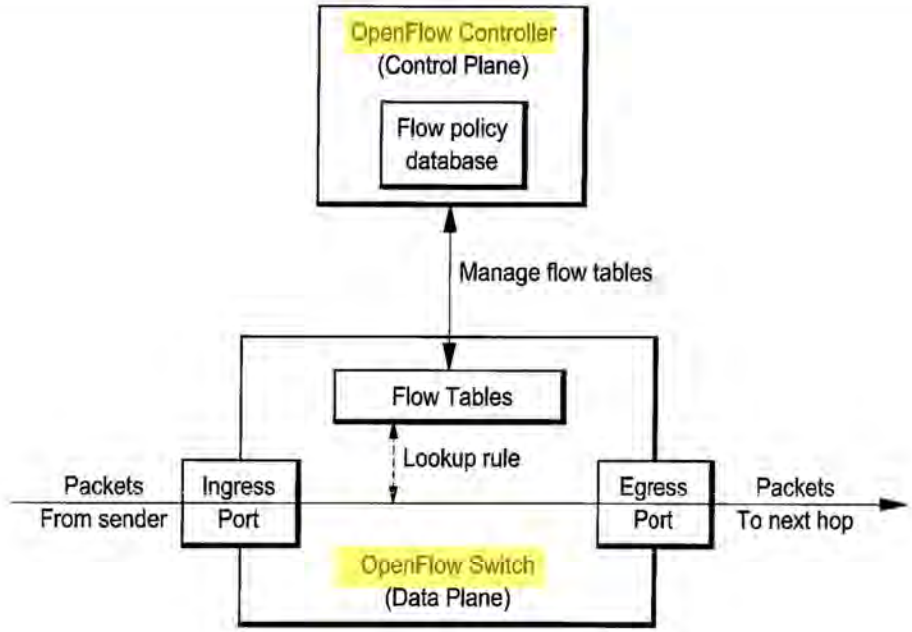
No.	’111 Patent Claim 23	Lin ’400
		switch 620 forwards the outgoing packets from the re-inject port 623-3 to the egress port 623-4 in accordance with the L2 switching logic of the SDN computer network 600 (see arrow 657). The outgoing packets exit the SDN switch 620 through the egress port 623-4 (see arrow 658) and move towards their destination.” Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Lin ‘400 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 23(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses servers that’s provide different functionalities, such as delivering web content as a web server. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0030] (“The video optimizer 150 is a computer server that provides video and image optimization and delivers opti-mized video and image content to the user devices 110 via the network 120. The video and image optimization is an on-demand service provided through the transcoding of the video and image content. For example, when a user device attempts to retrieve video from the origin server 160, the network controller 140 may decide that the flow meets certain criteria for content optimization. The network controller 140 then redirected the user devices 110 to the video optimizer 150 to retrieve the optimized content. The video optimizer 150 receives information in the redirect request from the user devices 110 or from the network controller 140 about the video or image content to be optimized and

No.	’111 Patent Claim 23	Lin ’400
		retrieve the video or image content from the corresponding origin server 160 for optimization and subsequent delivery to the user devices 110.”) Swenson at [0032] (“The video optimizer 150 and the origin server 160 are typically formed of one or more computers. While only one server of each video optimizer 150 and origin server 160 is shown in the environment 100 of FIG. 1, different embodi-ments may include multiple web servers and video servers operated by a single entity or multiple entities. In other embodiments, a single server may also provide different func-tionalities, such as delivering web content as a web server, as well as serving optimized video content.”) Swenson at [0034] (“The machine may be a server computer, a client computer, a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a cellular tele-phone, a smart phone, a web appliance, a network router, switch or bridge, or any machine capable of executing instructions 224 (sequential or otherwise) that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute instructions 224 to perform any one or more of the methodologies discussed herein.”) Swenson at [0058] (“Referring now to FIG. 4A, network traffic flows from the user device 110 through the steering device 130 and arrive at the origin server 160 over the network request path. For example, a browser on the user device 110 may request web content from the origin server 160. A HTTP request message initiated at the user device 110 is forwarded to the steering device 130 over the network link 411. A data switch 402 inside the steering device 130 then relays the request message to the origin server 160 over the network link 412. On the opposite direction, network traffic originated from the origin server 160 flows through the steering device 130 back to the user device 110 over the network response path. For example, the origin server 160 responds to the user request by sending web content over the network link 413 to the steering device 130, which forwards the web content to the user device 110 over the network link 416. Note that the network links 411 and 416 are two opposite directions on the same physical link, so are the network link pair 414 and 415. On the other hand, the network link pair 412 and 413 may or may not share the same network path because traffic between the steering device 130 and origin server 160 on opposite directions may be routed differently over one or more routers.”)

No.	’111 Patent Claim 23	Lin ’400
23[b]	wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device.	Lin ’400 discloses wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device. For example, Lin ’400 discloses that the sender component can be a virtual machine, a laptop computer, or a desktop computer, etc. Lin ’400 8:18-45 (“FIG. 7 schematically illustrates inspection of outgoing packets sent by the sender component 622 in the SDN computer network 600 in accordance with an embodiment of the present invention. In the example of FIG. 7, the sender component 622 (e.g., a virtual machine, a laptop computer, desktop computer, etc.) transmits outgoing packets to the ingress port 623-1 (see arrow 651). The SDN switch 620 receives the outgoing packets in the ingress port 623-1 and follows a flow rule that pertains to the outgoing packets (see arrow 652). In the example of FIG. 7, a redirect flow rule dictates that packets received by the SDN switch 620 in the ingress port 623-1 are to be forwarded to the redirect port 623-2. Accordingly, the SDN switch 620 forwards the outgoing packets to the redirect port 623-2 (see arrow 653), which is connected to the security service 630 (e.g., a virtual machine, server computer, appliance, etc.). The security service 630 receives the outgoing packets from the redirect port 623-2 (see arrow 654) and inspects the outgoing packets. After inspection, the security service 630 re-injects the outgoing packets (e.g., outgoing packets that passed inspection) back into the SDN switch 620 by way of the re-inject port 623-3 (see arrow 655). The SDN switch 620 receives the outgoing packets on the re-inject port 623-3. The SDN switch 620 forwards the outgoing packets from the re-inject port 623-3 to the egress port 623-4 in accordance with the L2 switching logic of the SDN computer network 600 (see arrow 657). The outgoing packets exit the SDN switch 620 through the egress port 623-4 (see arrow 658) and move towards their destination.”

No.	’111 Patent Claim 24	Lin ’400
24	The method according to claim 22, wherein the communication between the network node and the controller	Lin ’400 discloses the method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol. For example, Lin ’400 discloses using an Openflow protocol for communications between the switch and the security device.

No.	’111 Patent Claim 24	Lin ’400
	is based on, or uses, a standard protocol.	Lin ’400 1:17-32 (“The OpenFlow™ protocol is an open protocol for remotely controlling forwarding tables of network switches that are enabled for SDN. Generally speaking, the OpenFlow protocol allows direct access to and manipulation of the forwarding plane of network devices, such as switches and routers. A control plane of an OpenFlow™ protocol-compliant computer network (also referred to as an “OpenFlow™ controller”) may communicate with OpenFlow™ switches (i.e., network switches that are compliant with the OpenFlow™ protocol) to set flow policies that specify how the switches should manipulate packets of network traffic. Example packet manipulation actions include forwarding a packet to a specific port, modifying one or more fields of the packet, asking the controller for action to perform on the packet, or dropping the packet.”). Lin ’400 1:33-43 (“FIG. 1 shows a schematic diagram of an SDN computer network that is compliant with the OpenFlow™ protocol. Generally speaking, the OpenFlow™ protocol separates the control plane from the data plane. An OpenFlow™ controller serves as a control plane for making forwarding decisions based on flow policies, which may be stored in a flow policy database. The controller determines flow policies in conjunction with network forwarding setting and network topology. The flow policies may contain a condition and corresponding action to be performed when the condition is met. The action may specify how to manipulate a packet.”). Lin ’400 1:44-54 (“An OpenFlow™ switch serves as the data plane that forwards packets, e.g., from an ingress port to an egress port, according to flow tables maintained by the data plane. The data plane is a replacement of traditional switches. When the data plane does not know how to manipulate a specific packet, the data plane may request the controller to receive a flow rule for the specific packet, and store the flow rule in the flow tables. Other packets that meet the same condition as the specific packet will be processed in accordance with the flow rule. The control plane may also actively insert flow rules into the flow tables.”). Lin ’400 Claim 8 (“The SDN computer network of claim 7, wherein the specified packets are packets having a particular transport control protocol (TCP) source or destination port.”).

No.	'111 Patent Claim 24	Lin '400
		 *FIG. 1* (PRIOR ART) Fig. 1 (annotation added)

No.	’111 Patent Claim 27	Lin ’400
27	The method according to claim 1, wherein the network node comprises a router, a switch, or a bridge.	Lin ’400 discloses the method according to claim 1, wherein the network node comprises a router, a switch, or a bridge. For example, Lin ’400 discloses use of a switch or a router as the claimed network node. *See supra* at Claim 1. Lin ’400 1:58-2:4 (“In one embodiment, a software defined networking (SDN) computer network includes an SDN controller and an SDN switch. The SDN controller inserts flow rules in a flow table of the SDN switch to create an SDN pipe between a sender component and a security component. A broadcast function of the SDN switch to the ports that form the SDN pipe may be disabled. The SDN pipe allows outgoing packets sent by the sender component to be received by the security component. The security component inspects the outgoing packets for compliance with security policies and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection. The SDN controller may also insert a flow rule in the flow table of the SDN switch to bypass inspection of specified packets.”). Lin ’400 Claim 1 (“1. A software defined networking (SDN) computer network comprising: an SDN switch comprising a plurality of ports that receives network traffic of an SDN computer network, the SDN switch having a first port coupled to a sender component and a second port coupled to a security component, the SDN switch comprising a flow table that comprises a first flow rule to forward a packet received in the first port to the second port and a second flow rule to forward a packet received in the second port to the first port, the SDN switch receiving outgoing packets from the first port and forwarding the outgoing packets to the second port in accordance with the first flow rule, the outgoing packets being sent by the sender component to a destination component; and an SDN controller that controls forwarding behavior of the SDN switch and inserts the first and second flow rules into the flow table of the SDN switch, wherein the security component receives the outgoing packets from the second port of the SDN switch, inspects the outgoing packets, and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection, wherein the security component allows the outgoing packets to be forwarded to their destination by instructing the SDN switch to release copies of the outgoing packets.”).

No.	’111 Patent Claim 27	Lin ’400
		Lin ’400 Claim 3 (“The SDN computer network of claim 1, wherein the SDN switch comprises a physical packet switch, the SDN controller comprises one or more computers that send flow rules to the SDN switch, and the sender component comprises a computer coupled to the first port of the SDN switch.”). Lin ’400 3:11-24 (“Network security vendors provide network security services, such as firewall or deep packet inspection (DPI). Generally speaking, to provide network security services, packets of network traffic are intercepted for inspection. One way of intercepting network traffic is to place the security service in the middle of the packet forwarding path. This is illustrated in FIG. 3, where packets from a sender component (e.g., a sender computer) are received in an ingress port of a switch, forwarded to an egress port of the switch, and forwarded to the ingress port of a security component, such as a security service. The security service may inspect the packets, and forward the packets to an egress port of the switch toward the next hop, which may be another switch or a destination component (e.g., destination computer), for example.”). Lin ’400 1:17-32 (“ “The OpenFlow™ protocol is an open protocol for remotely controlling forwarding tables of network switches that are enabled for SDN. Generally speaking, the OpenFlow protocol allows direct access to and manipulation of the forwarding plane of network devices, such as switches and routers. A control plane of an OpenFlow™ protocol-compliant computer network (also referred to as an “OpenFlow™ controller”) may communicate with OpenFlow™ switches (i.e., network switches that are compliant with the OpenFlow™ protocol) to set flow policies that specify how the switches should manipulate packets of network traffic. Example packet manipulation actions include forwarding a packet to a specific port, modifying one or more fields of the packet, asking the controller for action to perform on the packet, or dropping the packet.”).

No.	’111 Patent Claim 28	Lin ’400
28	The method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet.	Lin ’400 discloses the method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet. For example, Lin ’400 discloses the use of IP addresses to identify packets being transmitted across the packet network (IP network). *See supra* Claim 1. Lin ’400 5:8-25 (“A flow table may include columns that indicate one or more conditions, a column that indicates an action to take when the conditions are met, and a column for statistics. A row on the flow table may comprise a flow rule. In the example of Table 1, the “Action” column indicates an action to take when conditions are met, and the “Count” column indicates statistics, such as byte count. The rest of the columns of Table 1 indicate conditions. For example, “IN_PORT”, “MAC src” (media access control (MAC) address of the source of the packet), “MAC dst” (MAC address of the destination of the packet), “IP src” (Internet Protocol (IP) address of the source of the packet), “IP dst” (IP address of the destination of the packet), etc. are conditions that identify a particular packet. When the conditions are met, i.e., the particular packet is identified, the action indicated in the corresponding “Action” column is performed on the packet. The asterisks in Table 1 indicate an irrelevant condition.”).

No.	’111 Patent Claim 29	Lin ’400
29	The method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet.	Lin ’400 discloses the method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet. For example, Lin ’400 discloses the use of TCP addresses to identify packets being transmitted across the packet network (TCP network). *See supra* Claim 28.

No.	’111 Patent Claim 29	Lin ’400
		See below

TABLE 2

IN_PORT	. . .	IP src	**TCP** src port	**TCP** dst port	. . .	Action	Count
Ingress_port_ID	*	*	*	80	*	Egress port	120
Egress_port_ID	*	*	80	*	*	Ingress port	120
Ingress_port_ID	*	*	*	*	*	Redirect port	10
Redirect_port_ID	*	*	*	*	*	Ingress port	10

Lin ’400 7:39-50 (“In the example of Table 2, the first two rows are bypass rules for bypassing packets coming from or going to a transport control protocol (TCP) port 80. More specifically, hypertext transfer protocol (HTTP) packets, i.e., port 80 packets, that are received in the ingress port with the Ingress_port_ID (i.e., ingress port 623-1) are forwarded directly to the egress port (i.e., egress port 623-4), instead of being redirected to the redirect port 623-2 for inspection by the security service 630. Similarly, HTTP packets received in the egress port with the Egress_port_ID (i.e., egress port 623-4) are forwarded directly to the ingress port 623-1 without being redirected to the security service 630.”).

TABLE 3

IN_PORT	. . .	IP src	**TCP** src port	**TCP** dst port	. . .	Action	Count
Ingress_port_ID	*	*	*	80	*	Redirect port	10
Redirect_port_ID	*	*	80	*	*	Ingress port	10
Ingress_port_ID	*	*	*	*	*	Egress port	130
Egress_port_ID	*	*	*	*	*	Ingress port	130

Lin ’400 8:10-18 (“In the example of Table 3, the top two rows are redirect flow rules for redirecting HTTP packets to the security service 630 for inspection, while the bottom two

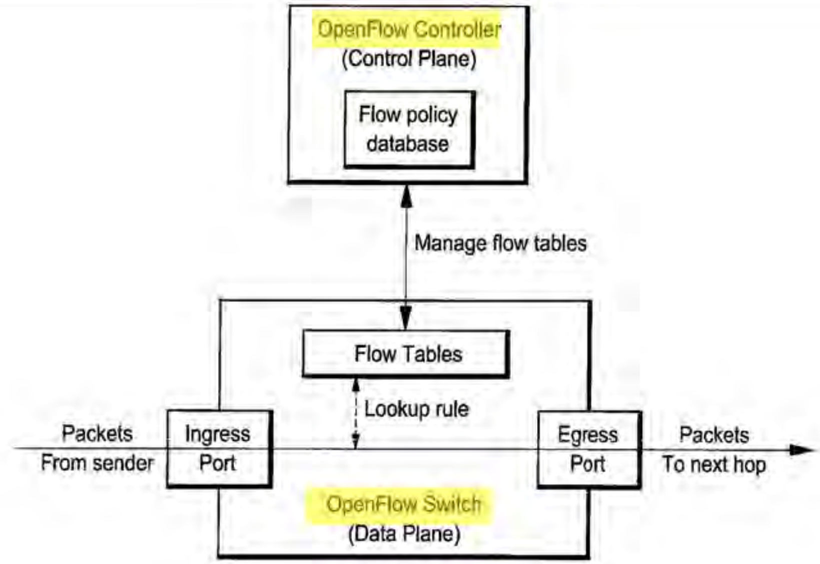
No.	’111 Patent Claim 29	Lin ’400
		rows are bypass flow rules for all packets. Because the redirect flow rules are at higher priority than the bypass flow rules, HTTP packets are sent through the SDN pipe formed in the SDN switch 620 between the sender component 622 and the security service 630. All other packets bypass the SDN pipe, and are accordingly not inspected by the security service 630. Lin ’400 Claim 8 (“The SDN computer network of claim 7, wherein the specified packets are packets having a particular transport control protocol (TCP) source or destination port.”).

No.	’111 Patent Claim 30	Lin ’400
30[a]	The method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets;	Lin ’400 discloses the method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets. For example, Lin ’400 discloses the switch receiving a packet from the sender component over the network, as it applies to one or more individual packets. *See also* Claim 1[c].
30[b]	checking, by the network node, if any one of the one or more additional packets satisfies the criterion;	Lin ’400 discloses checking, by the network node, if any one of the one or more additional packets satisfies the criterion. For example, Lin ’400 discloses matching the packet to criteria in the flow tables, as it applies to one or more individual packets. *See also* Claim 1[d].
30[c]	responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the	Lin ’400 discloses responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity. For example, Lin ’400 discloses, upon receiving a match of a criteria between the packet and the flow table, sending the packet over the network to the security device or to the destination, as it applies to one or more individual packets.

No.	’111 Patent Claim 30	Lin ’400
	additional packet to the second entity; and	*See also* Claim 1[e].
30[d]	responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction.	Lin ’400 discloses responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction. For example, Lin ’400 teaches that the devices check for a specific packet-applicable criterion, where if a packet satisfies this criterion by indication that port 80 is the s destination port, then the SDN switch sends the packet over the packet network to the security device, as it applies to one or more individual packets. *See also* Claim 1[f].

No.	’111 Patent Claim 31	Lin ’400
31[a]	The method according to claim 1, wherein the packet network is a Software Defined Network (SDN),	Lin ’400 discloses the method according to claim 1, wherein the packet network is a Software Defined Network (SDN). For example, Lin ’400 discloses using a software-defined network as the packet network. Lin ’400 Claim 1 (“A software defined networking (SDN) computer network comprising: an SDN switch comprising a plurality of ports that receives network traffic of an SDN computer network, the SDN switch having a first port coupled to a sender component and a second port coupled to a security component, the SDN switch comprising a flow table that comprises a first flow rule to forward a packet received in the first port to the second port and a second flow rule to forward a packet received in the second port to the first port, the SDN switch receiving outgoing packets from the first port and forwarding the outgoing packets to the second port in accordance with the first flow rule, the outgoing packets being sent by the sender component to a destination component; and an SDN controller that controls forwarding behavior of the SDN switch and inserts the first and second flow rules into the flow table of the SDN switch,

No.	’111 Patent Claim 31	Lin ’400
		wherein the security component receives the outgoing packets from the second port of the SDN switch, inspects the outgoing packets, and allows the outgoing packets to be forwarded to their destination when the outgoing packets pass inspection, wherein the security component allows the outgoing packets to be forwarded to their destination by instructing the SDN switch to release copies of the outgoing packets.”). Lin ’400 1:11-17 (“Software defined networking (SDN) is an emerging architecture for computer networking. Unlike traditional computer network architectures, SDN separates the control plane from the data plane. This provides many advantages, including relatively fast experimentation and optimization of switching and routing policies. SDN is applicable to both physical (i.e., real) and virtual computer networks.”). Lin ’400 1:17-32 (“The OpenFlow™ protocol is an open protocol for remotely controlling forwarding tables of network switches that are enabled for SDN. Generally speaking, the OpenFlow protocol allows direct access to and manipulation of the forwarding plane of network devices, such as switches and routers. A control plane of an OpenFlow™ protocol-compliant computer network (also referred to as an “OpenFlow™ controller”) may communicate with OpenFlow™ switches (i.e., network switches that are compliant with the OpenFlow™ protocol) to set flow policies that specify how the switches should manipulate packets of network traffic. Example packet manipulation actions include forwarding a packet to a specific port, modifying one or more fields of the packet, asking the controller for action to perform on the packet, or dropping the packet.”).

No.	’111 Patent Claim 31	Lin ’400
		 *FIG. 1* *(PRIOR ART)* Fig. 1 (annotation added)
31[b]	the packet is routed as part of a data plane and	Lin ’400 discloses that the packet is routed as part of a data plane. For example, Lin ’400 discloses that the packet is routed through the switch, where the switch comprises the data plane. Lin ’400 1:11-17 (“Software defined networking (SDN) is an emerging architecture for computer networking. Unlike traditional computer network architectures, SDN separates the control plane from the data plane. This provides many advantages, including relatively fast experimentation and optimization of switching and routing policies. SDN is applicable to both physical (i.e., real) and virtual computer networks.”).

No.	’111 Patent Claim 31	Lin ’400
		Lin ’400 3:40-64 (“Referring now to FIG. 6, there is shown a schematic diagram of an SDN computer network 600 in accordance with an embodiment of the present invention. In one embodiment, the SDN computer network 600 is compliant with the OpenFlow™ protocol. Accordingly, in one embodiment, the SDN controller 610 comprises an OpenFlow™ controller and the SDN switch 620 comprises an OpenFlow™ switch. The SDN controller 610 and the SDN switch 620 comprise the control plane and data plane, respectively, of the SDN computer network 600. The SDN computer network 600 may have a plurality of SDN switches 620 but only one is shown for clarity of illustration. The SDN controller 610 and the SDN switch 620 are logically separate components.”). Lin ’400 1:33-43 (“FIG. 1 shows a schematic diagram of an SDN computer network that is compliant with the OpenFlow™ protocol. Generally speaking, the OpenFlow™ protocol separates the control plane from the data plane. An OpenFlow™ controller serves as a control plane for making forwarding decisions based on flow policies, which may be stored in a flow policy database. The controller determines flow policies in conjunction with network forwarding setting and network topology. The flow policies may contain a condition and corresponding action to be performed when the condition is met. The action may specify how to manipulate a packet.”). Lin ’400 1:44-54 (“An OpenFlow™ switch serves as the data plane that forwards packets, e.g., from an ingress port to an egress port, according to flow tables maintained by the data plane. The data plane is a replacement of traditional switches. When the data plane does not know how to manipulate a specific packet, the data plane may request the controller to receive a flow rule for the specific packet, and store the flow rule in the flow tables. Other packets that meet the same condition as the specific packet will be processed in accordance with the flow rule. The control plane may also actively insert flow rules into the flow tables.”). Lin ’400 1:11-17 (“Software defined networking (SDN) is an emerging architecture for computer networking. Unlike traditional computer network architectures, SDN separates the control plane from the data plane. This provides many advantages, including relatively fast experimentation and optimization of switching and routing policies. SDN is applicable to both physical (i.e., real) and virtual computer networks.”).

No.	'111 Patent Claim 31	Lin '400
		Lin '400 2:47-65 ("FIG. 2 shows a schematic diagram of a computer system 100 that may be employed with embodiments of the present invention. The computer system 100 may be employed as a control plane and/or a data plane, for example. As another example, the computer system 100 may be employed to host a virtualization environment that supports a plurality of virtual machines. The computer system 100 may have fewer or more components to meet the needs of a particular application. The computer system 100 may include one or more processors 101. The computer system 100 may have one or more buses 103 coupling its various components. The computer system 100 may include one or more user input devices 102 (e.g., keyboard, mouse), one or more data storage devices 106 (e.g., hard drive, optical disk, Universal Serial Bus memory), a display monitor 104 (e.g., liquid crystal display, flat panel monitor), a computer network interface 105 (e.g., network adapter, modem), and a main memory 108 (e.g., random access memory). The computer network interface 105 may be coupled to a computer network 109.").
31[c]	the network node communication with the controller serves as a control plane.	Lin '400 discloses the network node communication with the controller serves as a control plane. For example, Lin '400 discloses that the controller comprises the control plane. Lin '400 3:40-64 ("Referring now to FIG. 6, there is shown a schematic diagram of an SDN computer network 600 in accordance with an embodiment of the present invention. In one embodiment, the SDN computer network 600 is compliant with the OpenFlow™ protocol. Accordingly, in one embodiment, the SDN controller 610 comprises an OpenFlow™ controller and the SDN switch 620 comprises an OpenFlow™ switch. The SDN controller 610 and the SDN switch 620 comprise the control plane and data plane, respectively, of the SDN computer network 600. The SDN computer network 600 may have a plurality of SDN switches 620 but only one is shown for clarity of illustration. The SDN controller 610 and the SDN switch 620 are logically separate components."). Lin '400 1:11-17 ("Software defined networking (SDN) is an emerging architecture for computer networking. Unlike traditional computer network architectures, SDN separates the control plane from the data plane. This provides many advantages, including relatively fast experimentation and optimization of switching and routing policies. SDN is applicable to both physical (i.e., real) and virtual computer networks.").

EXHIBIT D-5
Defendant's Preliminary Invalidity Contentions
Orckit Corporation v. Cisco Systems, Inc., 2:22-cv-00276-JRG-RSP

Chart for U.S. Patent 10,652,111 ("the '111 Patent")
U.S. Patent Publication No. 2013/0291088 to Shieh et al. ("Shieh '088")

As shown in the chart below, all Asserted Claims of the '111 Patent are invalid under (1) AIA-35 U.S.C. § 102 (a) because Shieh '088 meets each element of those claims, and/or (2) 35 U.S.C. § 103 because Shieh '088 renders those claims obvious either alone, or in combination with the knowledge of a person having ordinary skill in the art, and in further combination with the references specifically identified below and in the following claim chart and/or one or more references identified in Defendant's Preliminary Invalidity Contentions. The following quotations and diagrams come from Shieh '088 titled "Cooperative Network Security Inspection", which was filed on Apr. 10, 2013, and published on Oct. 31, 2013.

Motivations to combine the disclosures in Shieh '088 with disclosures in other publications known in the art, as explained in this chart, include at least the similarity in subject matter between the references to the extent they concern methods relating to routing certain network traffic to entities for further analysis and inspection. Insofar as the references cite other patents or publications, or suggest additional changes, one of ordinary skill in the art would look beyond a single reference to other references in the field.

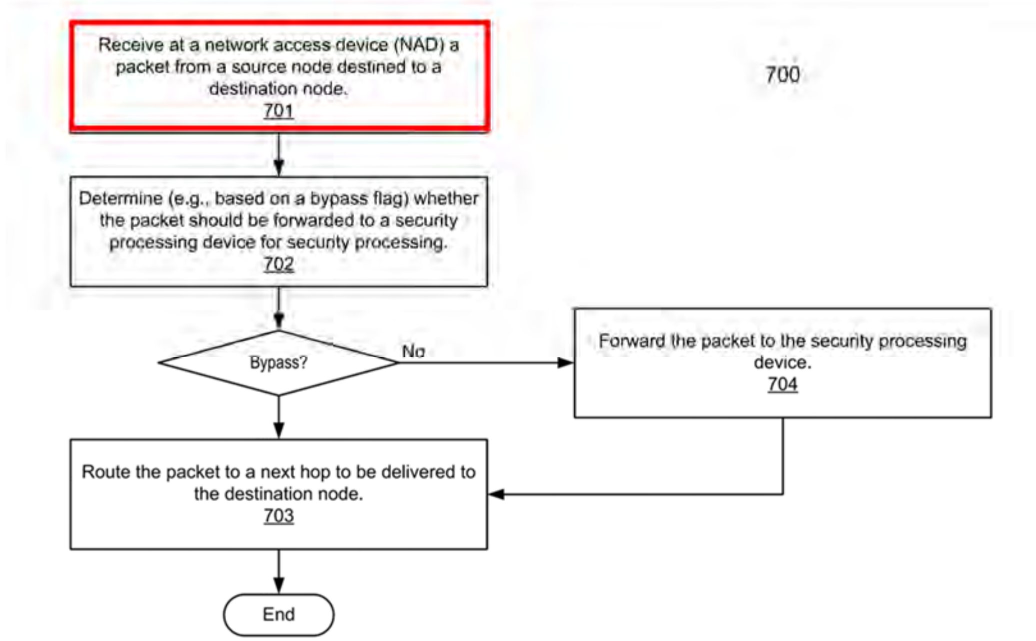
These invalidity contentions are based on Defendant's present understanding of the Asserted Claims, and Orckit's apparent construction of the claims in its November 3, 2022 Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1, and Orckit's January 19, 2023 First Amended Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1 (Orckit's "Infringement Disclosures"), which is deficient at least insofar as it fails to cite any documents or identify accused structures, acts, or materials in the Accused Products with particularity. Defendant does not agree with Orckit's application of the claims, or that the claims satisfy the requirements of 35 U.S.C. § 112. Defendant's contentions herein are not, and should in no way be seen as, admissions or adoptions as to any particular claim scope or construction, or as any admission that any particular element is met by any accused product in any particular way. Defendant objects to any attempt to imply claim construction from this chart. Defendant's prior art invalidity contentions are made in a variety of alternatives and do not represent Defendant's agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein.

The following contentions are subject to revision and amendment pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules, and the Orders of record in this matter subject to further investigation and discovery regarding the prior art and the Court's construction of the claims at issue.

No.	'111 Patent Claim 1	Shieh '088
1[preamble]	A method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising:	Shieh '088 discloses a method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node. For example, Shieh '088 discloses that it relates to a network system that operates on a packet from a source node destined to a destination mode controlled by a controller. Shieh '088 further discloses that the controller is external to the network access devices. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. Shieh '088 ¶ [0002] ("Embodiments of the present invention relate generally to network security. More particularly, embodiments of the invention relate to enabling network security with network equipment."). Shieh '088 ¶ [0017] ("According to some embodiments, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function that performs the distribution of network traffic; and 2) a security-processing function that performs security processing, including security inspection and policy enforcement. The IO function receives the packets and uses a session table to forward the packets to the security-processing function. A session table is a data structure that stores connection states, including the destination of the security-processing function. In one embodiment, the IO function determines, based on an internal data structure such as a session or flow table, whether the packet should be forwarded to the security processing function for security inspection. The configuration of the IO function to control whether to forward the packets to the security processing function can be set based on a command received from an administrator or alternatively, based on a signal received from the security processing function."). Shieh '088 ¶ [0018] ("According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of

No.	’111 Patent Claim 1	Shieh ’088
		filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”). Shieh ’088 ¶ [0021] (“According to one embodiment, network access device 204 is associated with a distributed firewall 212 that includes various firewall processing modules, for example, each being executed within a virtual machine (VM). In one embodiment, each firewall module is responsible for performing one or more firewall functions, but it does not include all of the firewall functions of a firewall. Examples of the firewall functions include, but are not limited to, network address translation (NAT), virtual private network (VPN), deep packet inspection (DPI), and/or anti-virus, etc. In one embodiment, some of the firewall processing modules are located within network access device 204 (e.g., firewall modules 209) and some are located external to network access device 204 (e.g., firewall modules 210 maintained by firewall processing node(s) 211, which may be a dedicated firewall processing machine. All of the firewall modules 209-210 are managed by firewall controller 208, which may be located within network access device 204, or external to network access device 204, such as, for example, in a public cloud associated with network 203, or in a private cloud associated with network 205. Controller 208 and firewall processing modules 209-210 collectively are referred to herein as distributed firewall 212.”). Shieh ’088 ¶ [0023] (“According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session

No.	'111 Patent Claim 1	Shieh '088
		or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210."). Shieh '088 ¶ [0049] ("FIG. 7 is a flow diagram illustrating a method for performing firewall operations using a distributed firewall according to one embodiment of the invention. Method 700 may be performed by processing logic that may include software, hardware, or a combination of both. For example, method 700 may be performed by distributed firewall 212 of FIG. 1. Referring to FIG. 7, at block 701, a network access device receives a packet from a source node destined to a destination node. At block 702, the network access device determines whether the packet should be forwarded to a security device for security inspection. For example, processing logic may check whether there is an entry exists in a session table for the current session. If not, it may forward the packet to the security device for security processing at block 704. Alternatively, the processing logic may check whether there is a bypass flag set to a predetermined value for the current session. If there is, the packet will not be forwarded to the security device; instead, the packet will be directly routed to the destination node at block 703.").

No.	’111 Patent Claim 1	Shieh ’088
		 FIG. 7 Fig. 7 (annotation added) Shieh ’088 ¶ [0021] (“All of the firewall modules 209-210 are managed by firewall controller 208, which may be located within network access device 204, or external to network access device 204, such as, for example, in a public cloud associated with network 203, or in a private cloud associated with network 205.”).

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		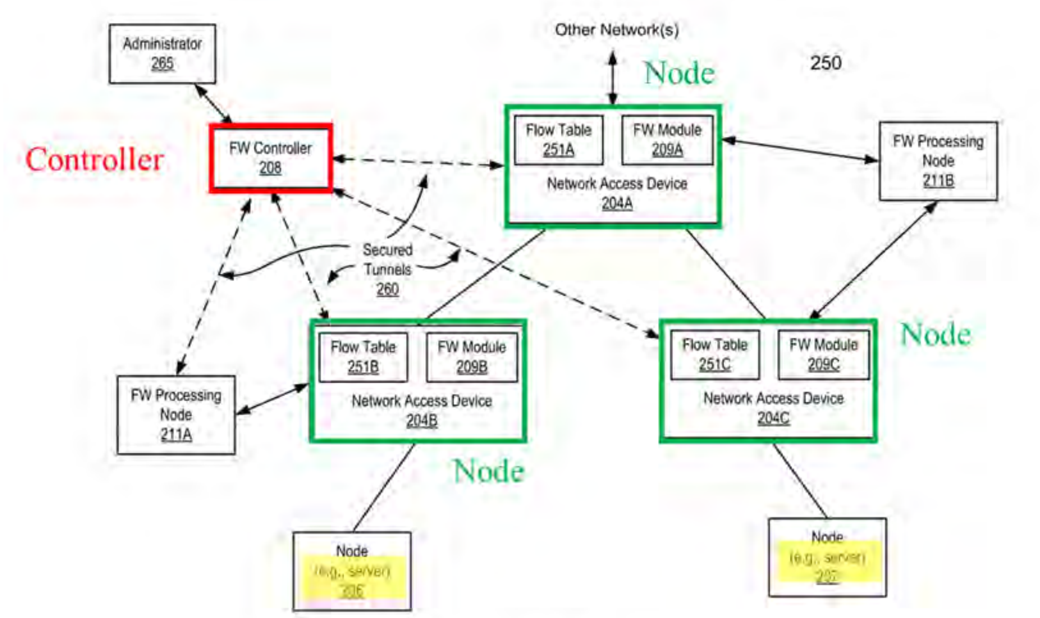 FIG. 2A Fig. 2A (annotation added) Shieh ’088 ¶ [0042] (“In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache.”).

No.	'111 Patent Claim 1	Shieh '088
1[a]	sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion;	Shieh '088 discloses sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion. For example, Shieh '088 discloses an external controller that controls network nodes in a packet network, and identifies a command sent by the controller to the network access devices through a persistent connection to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device. Shieh '088 ¶ [0017] ("According to some embodiments, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function that performs the distribution of network traffic; and 2) a security-processing function that performs security processing, including security inspection and policy enforcement. The IO function receives the packets and uses a session table to forward the packets to the security-processing function. A session table is a data structure that stores connection states, including the destination of the security-processing function. In one embodiment, the IO function determines, based on an internal data structure such as a session or flow table, whether the packet should be forwarded to the security processing function for security inspection. The configuration of the IO function to control whether to forward the packets to the security processing function can be set based on a command received from an administrator or alternatively, based on a signal received from the security processing function."). Shieh '088 ¶ [0018] ("According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.")

No.	'111 Patent Claim 1	Shieh '088
		Shieh '088 ¶ [0023] ("According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.") Shieh '088 ¶ [0025] ("According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols."). Shieh '088 ¶ [0026] ("The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple

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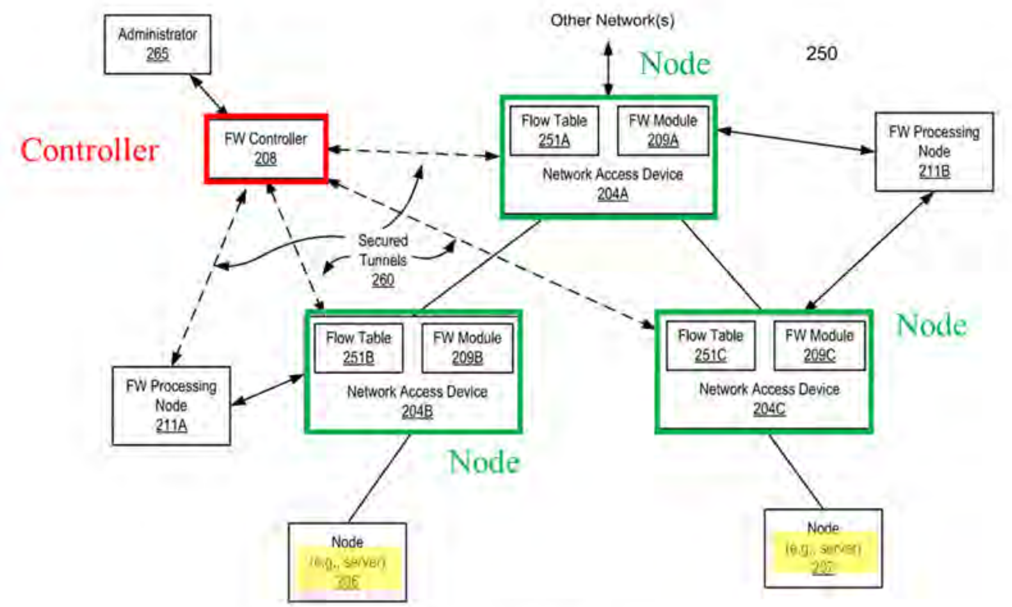
		flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”). Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”).

No.	’111 Patent Claim 1	Shieh ’088
		 FIG. 2A Fig. 2A (annotation added) Shieh ’088 ¶ [0029] (“According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment, controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B, whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection

No.	’111 Patent Claim 1	Shieh ’088
		on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”). Shieh ’088 ¶ [0035] (“An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on.”). Shieh ’088 ¶ [0036] (“During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Shieh ’088 ¶ [0049] (“In one embodiment, firewall modules 300A-300B could be distributed in different networks, even on different locations, as long as the modules can reach the module that is next in terms of processing and the central controller. In one embodiment, virtual I/O modules and corresponding security processing modules are in a public cloud and the central controller is in a private cloud. This configuration may provide the flexibility to secure and control packets coming from the public cloud, and allow central controller having overall view of traffic from Internet as well as from internal network.”).
1[b]	receiving, by the network node from the controller, the instruction and the criterion;	Shieh ’088 discloses receiving, by the network node from the controller, the instruction and the criterion. For example, Shieh ’088 discloses that a command is received by the network access devices from the controller to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device.

No.	'111 Patent Claim 1	Shieh '088
		See supra at 1[a]. Shieh '088 ¶ [0023] ("According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.") Shieh '088 ¶ [0028] ("Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol."). Shieh '088 ¶ [0029] ("According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network

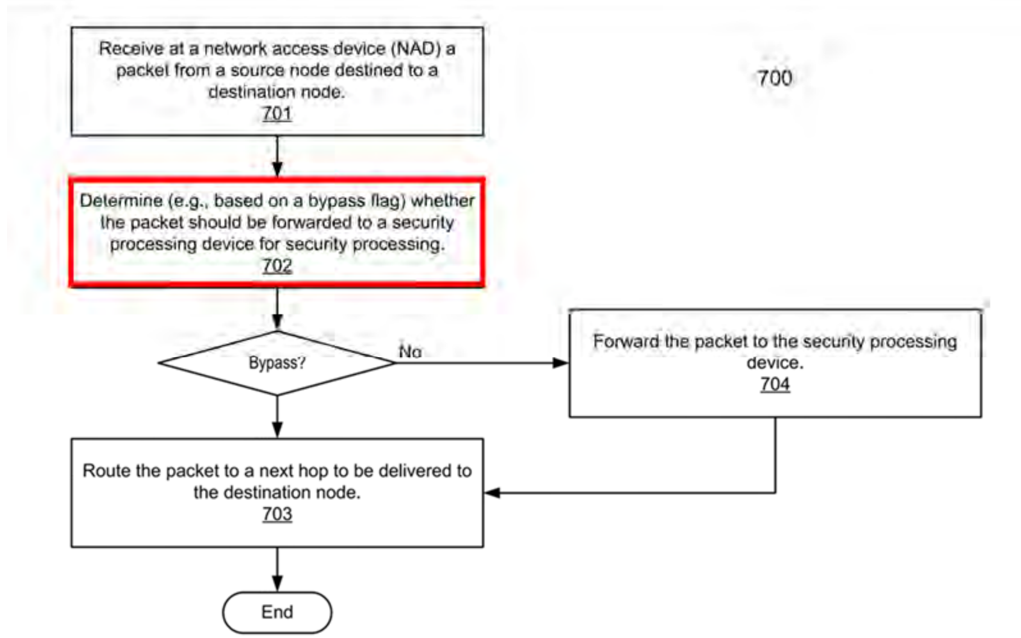
No.	’111 Patent Claim 1	Shieh ’088
		access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment, controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B, whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”). Shieh ’088 Claim 1 (“A computer-implemented method, comprising: receiving at a network access device a packet from a source node destined to a destination node; examining a data structure maintained by the network access device to determine whether the data structure stores a data member having a predetermined value, the data member indicating whether the packet should undergo security processing; if the data member matches the predetermined value, transmitting the packet to a security device associated with the network access device to allow the security device to perform content inspection, and in response to a response received from the security device, routing the packet to the destination node dependent upon the response; and transmitting the packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value.”). Shieh ’088 Claim 17 (“The system of claim 15, further comprising a controller to manage the network access device and the security device, wherein the network access device is further to receive a message having a data value from the controller, the data value indicating whether the network access device should forward further packets to the security device for security inspection, and store the data value in the data member of the data structure.”).

No.	’111 Patent Claim 1	Shieh ’088
1[c]	receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity;	Shieh ’088 discloses receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity. For example, Shieh ’088 discloses that a network access device receives a packet from a source node that is addressed to a destination node where the method is used to process a network flow. Shieh ’088 Claim 1 (“A computer-implemented method, comprising: receiving at a network access device a packet from a source node destined to a destination node; examining a data structure maintained by the network access device to determine whether the data structure stores a data member having a predetermined value, the data member indicating whether the packet should undergo security processing; if the data member matches the predetermined value, transmitting the packet to a security device associated with the network access device to allow the security device to perform content inspection, and in response to a response received from the security device, routing the packet to the destination node dependent upon the response; and transmitting the packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value.”). Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to

No.	’111 Patent Claim 1	Shieh ’088
		stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”). Shieh ’088 ¶ [0020] (“FIG. 1 is a block diagram illustrating an example of network configuration according to one embodiment of the invention. Referring to FIG. 1, network access device 204, which may be a router or gateway, a switch or an access point, etc., provides an interface between network 203 and network 205. Network 203 may be an external network such as a wide area network (WAN) (e.g., Internet) while network 205 represents a local area network (LAN). Nodes 206-207 go through gateway device 204 in order to reach nodes 201-202, or vice versa. Any of nodes 201-202 and 206-207 may be a client device (e.g., a desktop, laptop, Smartphone, gaming device) or a server.”). Shieh ’088 ¶ [0037] (“FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.”).

No.	’111 Patent Claim 1	Shieh ’088
		Shieh ’088 ¶ [0049] (“FIG. 7 is a flow diagram illustrating a method for performing firewall operations using a distributed firewall according to one embodiment of the invention. Method 700 may be performed by processing logic that may include software, hardware, or a combination of both. For example, method 700 may be performed by distributed firewall 212 of FIG. 1. Referring to FIG. 7, at block 701, a network access device receives a packet from a source node destined to a destination node. At block 702, the network access device determines whether the packet should be forwarded to a security device for security inspection. For example, processing logic may check whether there is an entry exists in a session table for the current session. If not, it may forward the packet to the security device for security processing at block 704. Alternatively, the processing logic may check whether there is a bypass flag set to a predetermined value for the current session. If there is, the packet will not be forwarded to the security device; instead, the packet will be directly routed to the destination node at block 703.”).
1[d]	checking, by the network node, if the packet satisfies the criterion;	Shieh ’088 discloses checking, by the network node, if the packet satisfies the criterion. For example, Shieh ’088 discloses a network access device that uses filtering rules concerning whether and/or what types of packets should be forwarded to a security device. Shieh ’088 ¶ [0039] “(An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the forwarding table. If it cannot find the connection in its local cache, the packets are forwarded to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets.”).

No.	’111 Patent Claim 1	Shieh ’088
		Shieh ’088 Claim 1 (“A computer-implemented method, comprising: receiving at a network access device a packet from a source node destined to a destination node; examining a data structure maintained by the network access device to determine whether the data structure stores a data member having a predetermined value, the data member indicating whether the packet should undergo security processing; if the data member matches the predetermined value, transmitting the packet to a security device associated with the network access device to allow the security device to perform content inspection, and in response to a response received from the security device, routing the packet to the destination node dependent upon the response; and transmitting the packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value.”).

No.	'111 Patent Claim 1	Shieh '088
		 Fig. 7 (annotation added) Shieh '088 ¶ [0018] ("According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.").

No.	’111 Patent Claim 1	Shieh ’088
		Shieh ’088 ¶ [0023] (“According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.”) Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”). Shieh ’088 ¶ [0029] (“According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment,

No.	’111 Patent Claim 1	Shieh ’088
		controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B, whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”).
1[e]	responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity; and	Shieh ’088 discloses responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity. Shieh ’088 discloses transmitting the packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value. Shieh ’088 ¶ [0042] (“In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache.”). Shieh ’088 ¶ [0039] “(An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a

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		packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the forwarding table. If it cannot find the connection in its local cache, the packets are forwarded to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets.”). Shieh ’088 ¶ [0035] “(An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on.”). Shieh ’088 ¶ [0037] “(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating

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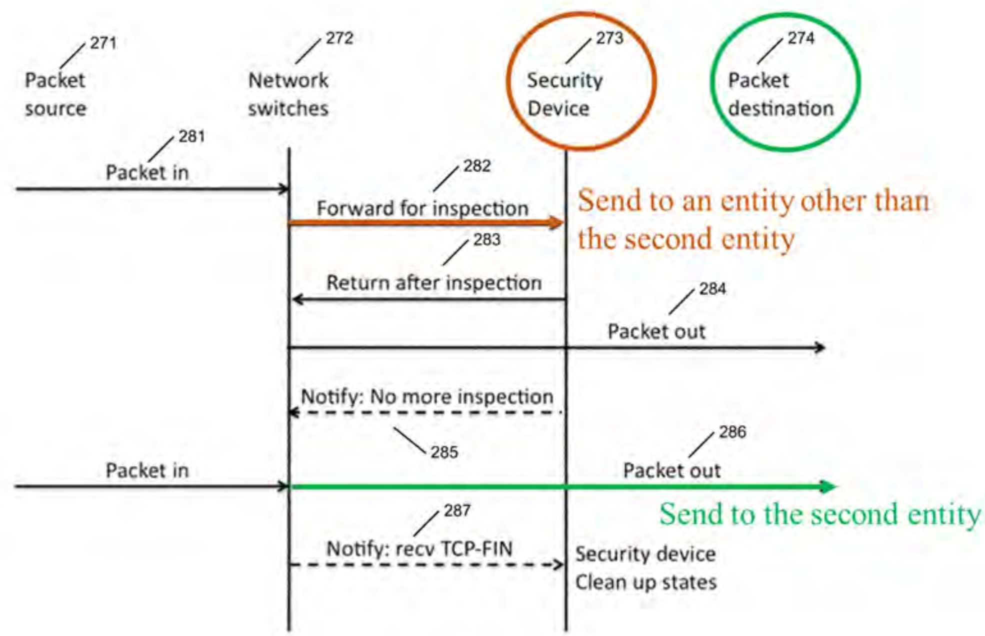
		that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.”).  FIG. 2B Fig. 2B (annotation added) Shieh ’088 Claim 1 (“A computer-implemented method, comprising: receiving at a network access device a packet from a source node destined to a destination node;

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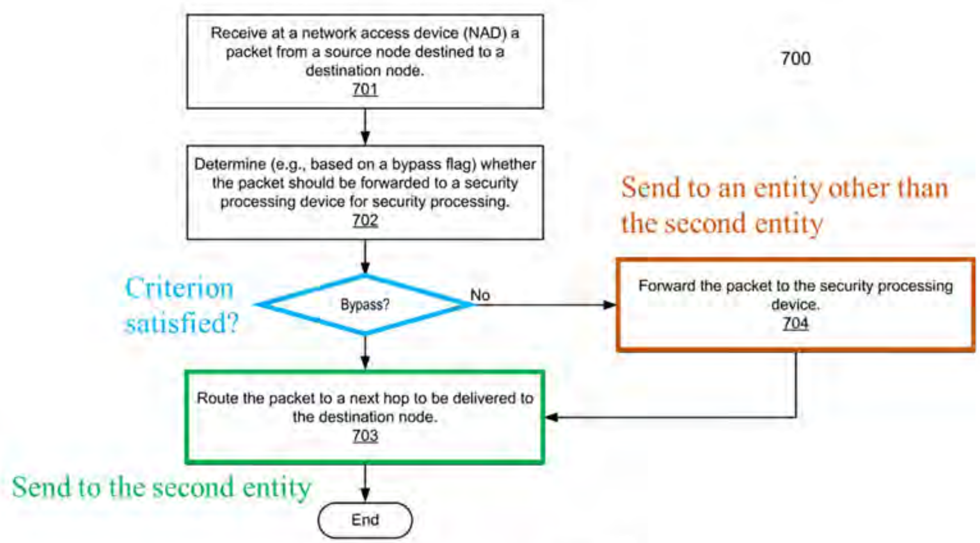
		examining a data structure maintained by the network access device to determine whether the data structure stores a data member having a predetermined value, the data member indicating whether the packet should undergo security processing; if the data member matches the predetermined value, transmitting the packet to a security device associated with the network access device to allow the security device to perform content inspection, and in response to a response received from the security device, routing the packet to the destination node dependent upon the response; and transmitting the packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value.”).  Fig. 7 (annotation added)
1[f]	responsive to the packet satisfying the criterion, sending the	Shieh ’088 discloses responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity.

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	packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity.	For example, Shieh ’088 discloses an embodiment in which a “virtual I/O module” functions as a network nodes that receives packets from servers and sends packets to an external network. Shieh ’088 further discloses sending the packet to the controller if it cannot find an existing connection in its local cache. Shieh ’088 discloses bypass rules, such as when the bypass flag matches a predetermined value, that when satisfied, instructs that the packet will be sent from the virtual I/O module to a central controller capable of deep packet inspection responsive to the instruction. Shieh ’088 ¶ [0042] (“In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache.”). Shieh ’088 ¶ [0039] “(An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the forwarding table. If it cannot find the connection in its local cache, the packets are forwarded to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors

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		such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets."). Shieh '088 ¶ [0035] "(An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on."). Shieh '088 ¶ [0036] "(During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes."). Shieh '088 ¶ [0037] "(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes

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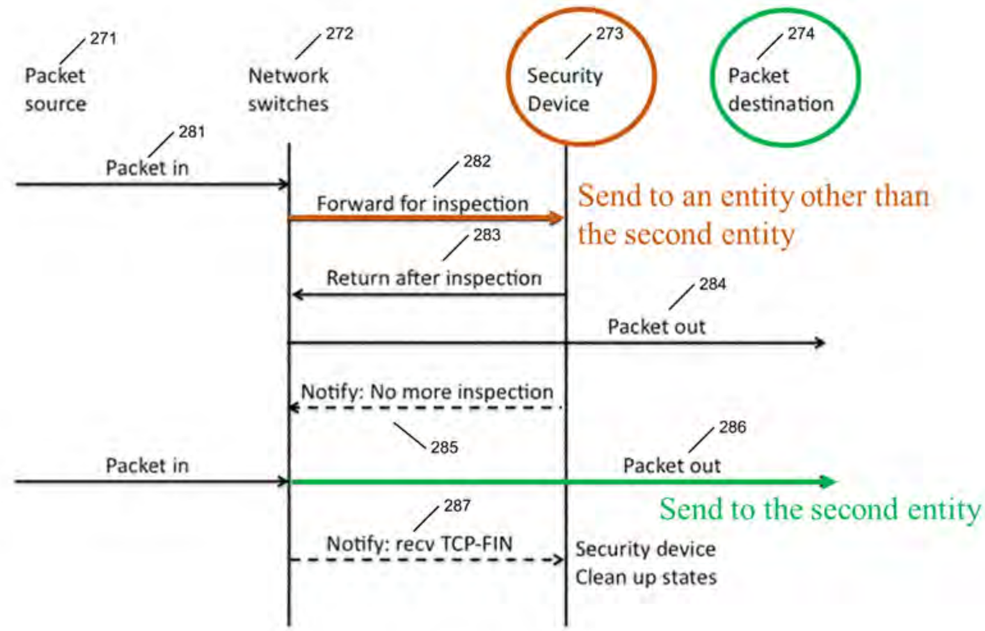
		may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.").  FIG. 2B Fig. 2B (annotation added) Shieh '088 ¶ [0021] "(According to one embodiment, network access device 204 is associated with a distributed firewall 212 that includes various firewall processing modules, for example, each being executed within a virtual machine (VM). In one embodiment, each firewall module is responsible for performing one or more firewall functions, but it does not include all of the firewall functions of a firewall. Examples of the firewall functions include:

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		but are not limited to, network address translation (NAT), virtual private network (VPN), deep packet inspection (DPI), and/or anti-virus, etc. In one embodiment, some of the firewall processing modules are located within network access device 204 (e.g., firewall modules 209) and some are located external to network access device 204 (e.g., firewall modules 210 maintained by firewall processing node(s) 211, which may be a dedicated firewall processing machine. All of the firewall modules 209-210 are managed by firewall controller 208, which may be located within network access device 204, or external to network access device 204, such as, for example, in a public cloud associated with network 203, or in a private cloud associated with network 205. Controller 208 and firewall processing modules 209-210 collectively are referred to herein as distributed firewall 212."). Shieh '088 ¶ [0028] "(Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol."). Shieh '088 ¶ [0040] "(In one embodiment, each of security processing modules 309-311 performs major security processing functions, such as, for example, NAT, VPN, DPI, and/or anti-virus, etc. A security processing module receives packets and runs the packets through one or more various security functions in the module for security processing. There could be several security modules and each handles the same or different security functions. If the packets need to go through another security or service processing, the module sends the packets to the other modules. Optionally, it can run the packets through a load balancing mechanism to distribute the load to multiple modules. If a module is the last processing module in the chain to process the packets, it can forward the packets back to the virtual I/O

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		module to send out, or send the packet out directly to its destination if it's configured to do so.”). Shieh ’088 ¶ [0041] (“In one embodiment, each of service processing modules 312-313 performs one or more of the functions of security processing module, such as, for example, NAT, VPN, DPI, and/or anti-virus, etc. However, it is different from the security processing module in that it only receives and sends packets to the same security processing module. If the tasks cannot be done in a security processing module, for example, due to a resource limitation, system load, or the requirement of a different operation system, the packets can be forwarded to one or more of service processing modules 312-313 for further processing. The packets then are sent back to the same security processing module for the next security function processing. To further share the system load, any of security processing modules 309-311 can load balance the computational-intensive services using multiple service processing modules.”). Shieh ’088 Claim 1 (“A computer-implemented method, comprising: receiving at a network access device a packet from a source node destined to a destination node; examining a data structure maintained by the network access device to determine whether the data structure stores a data member having a predetermined value, the data member indicating whether the packet should undergo security processing; if the data member matches the predetermined value, transmitting the packet to a security device associated with the network access device to allow the security device to perform content inspection, and in response to a response received from the security device, routing the packet to the destination node dependent upon the response; and transmitting the packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value.”).

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		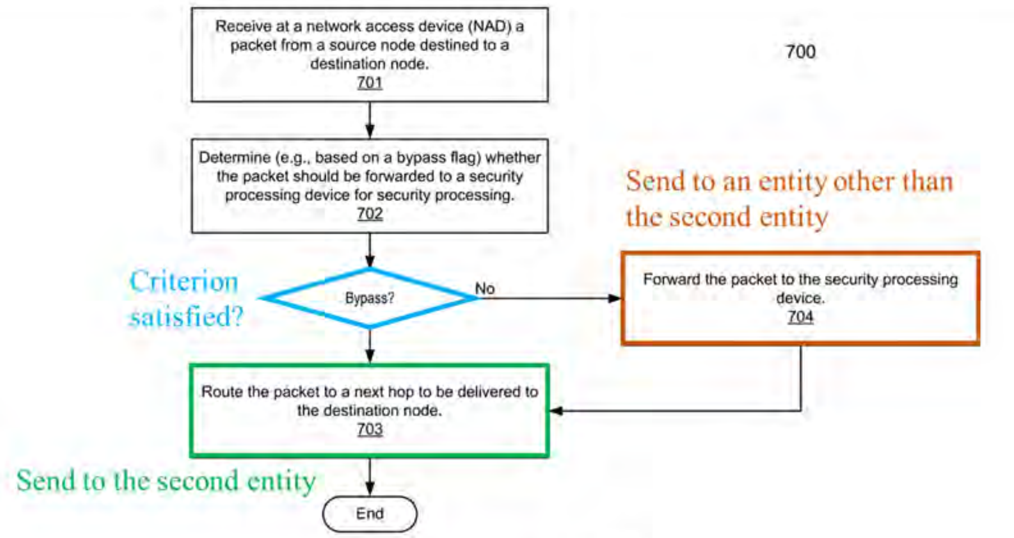 FIG. 7 Fig. 7 (annotation added)

No.	'111 Patent Claim 2	Shieh '088
2[a]	The method according to claim 1, wherein the instruction is 'probe', 'mirror', or 'terminate' instruction, and	Shieh '088 discloses wherein the instruction is 'probe', 'mirror', or 'terminate' instruction. For example, Shieh '088 discloses an external controller that controls network nodes in a packet network, and identifies a command sent by the controller to the network access devices through a persistent connection to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device. A person of ordinary skill would understand that such demands could include a probe, mirror, or terminate command. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Shieh '088 is found to not meet this limitation, wherein the instruction is 'probe', 'mirror', or 'terminate' instruction would have been obvious to a person having ordinary skill in the art, as explained below.

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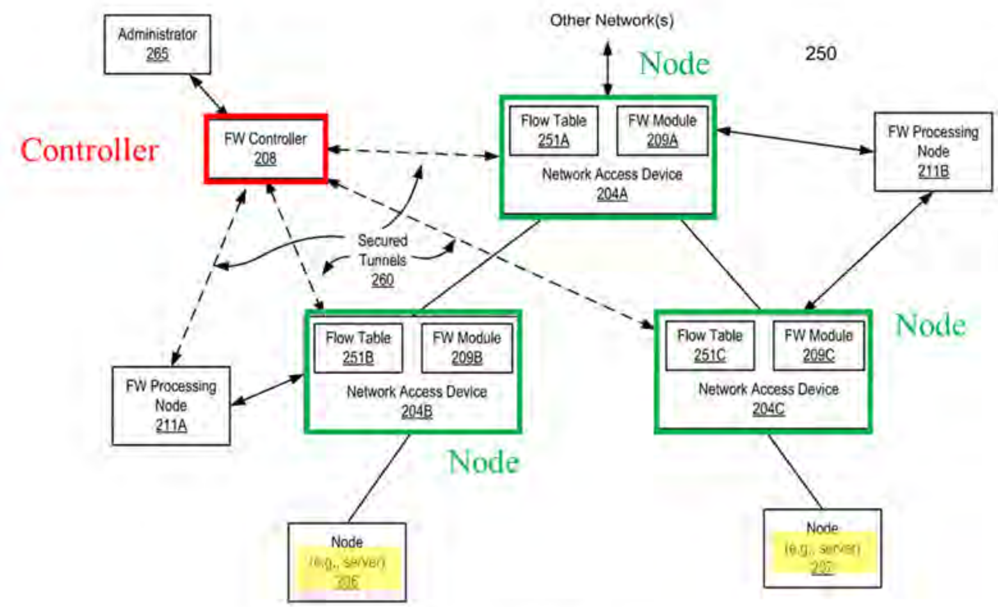
		Shieh ’088 ¶ [0017] (“According to some embodiments, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function that performs the distribution of network traffic; and 2) a security-processing function that performs security processing, including security inspection and policy enforcement. The IO function receives the packets and uses a session table to forward the packets to the security-processing function. A session table is a data structure that stores connection states, including the destination of the security-processing function. In one embodiment, the IO function determines, based on an internal data structure such as a session or flow table, whether the packet should be forwarded to the security processing function for security inspection. The configuration of the IO function to control whether to forward the packets to the security processing function can be set based on a command received from an administrator or alternatively, based on a signal received from the security processing function.”). Shieh ’088 ¶ [0018] (“According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”) Shieh ’088 ¶ [0023] (“According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one

No.	'111 Patent Claim 2	Shieh '088
		embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.") Shieh '088 ¶ [0025] ("According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols."). Shieh '088 ¶ [0026] ("The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.").

No.	’111 Patent Claim 2	Shieh ’088
		Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”).

No.	’111 Patent Claim 2	Shieh ’088
		 FIG. 2A Fig. 2A (annotation added) Shieh ’088 ¶ [0029] (“According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment, controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B, whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection

No.	'111 Patent Claim 2	Shieh '088
		on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session."). Shieh '088 ¶ [0035] ("An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on."). Shieh '088 ¶ [0036] ("During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes."). Shieh '088 ¶ [0049] ("In one embodiment, firewall modules 300A-300B could be distributed in different networks, even on different locations, as long as the modules can reach the module that is next in terms of processing and the central controller. In one embodiment, virtual I/O modules and corresponding security processing modules are in a public cloud and the central controller is in a private cloud. This configuration may provide the flexibility to secure and control packets coming from the public cloud, and allow central controller having overall view of traffic from Internet as well as from internal network."). Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Shieh '088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 2[a] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

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		For example, Chua discloses programming network nodes with redirecting, mirroring, and blocking programmed actions. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header”) Chua at 28:7-32 (“In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data, forward packets of the packet flow to a destination of the packet flow, forward packets of malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from

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		which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.") As another example, Copeland discloses probing, copying, and terminating rules configured on the network device. Copeland at [0057] ("In accordance with an aspect of the invention, a flow is considered terminated after a predetermined period of time has elapsed on a particular connection or port. For example, if HTTP Web traffic on port 80 ceases for a predetermined period of time, but other traffic begins to occur on port 80 after the expiration of that predetermined time period, it is considered that a new flow has begun, and the system responds accordingly to assign a new flow number and track the statistics and characteristics thereof. In the disclosed embodiment, the predetermined time period is 330 seconds, but those skilled in the art will understand that this time is arbitrary and may be heuristically adjusted.") Copeland at [0082] ("Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.") Copeland at [0093] ("As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no

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		more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.”) Copeland at [0095] (“When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.”) Copeland at [0099] (“As another example, if a particular host sends a large number of SYN packets to a target host and in response receives numerous R packets from the targeted host, a potential TCP probe is indicated. Likewise, numerous UDP packets sent from one host to a targeted host and numerous ICMP "port unavailable" packets received from the targeted host indicate a potential UDP probe. A stealth probe is indicated by multiple packets from the same source port number sent to different port numbers on a targeted host.”) Copeland at [0107] (“A flow is terminated if no communications occur between the two IP addresses and the one low port (e.g. port 80) for 330 seconds. Most Web browsers or a TCP connec-tion send a reset packet (i.e. a packet with the R flag set) if no communications are sent or received for 5 minutes. An analysis can determine if the flow is abnormal or not for HTTP communications.”) Copeland at [0123] (“Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.”) Copeland at [0145] (“A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts

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		scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.”) Copeland at [0158] (“Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.”)
2[b]	upon receiving by the network node the ‘terminate’' instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller.	Shieh ’088 discloses upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller. For example, Shieh ’088 discloses an external controller that controls network nodes in a packet network, and identifies a command sent by the controller to the network access devices through a persistent connection to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device. A person of ordinary skill would understand that such demands could include a terminate command. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, upon receiving by the network node the ‘terminate ' instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Shieh ’088 ¶ [0017] (“According to some embodiments, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function that performs the distribution of network traffic; and 2) a security-processing function that performs security processing, including security inspection and policy enforcement. The IO function receives the packets and uses a session table to forward the packets to the security-processing function. A session table is a data structure that stores connection states, including the destination of the security-processing function. In one embodiment, the IO function determines, based on an internal data structure such as a session or flow table, whether the packet should be forwarded to the security processing function for security inspection. The configuration of the IO function to

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		control whether to forward the packets to the security processing function can be set based on a command received from an administrator or alternatively, based on a signal received from the security processing function."). Shieh '088 ¶ [0018] ("According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.") Shieh '088 ¶ [0023] ("According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.") Shieh '088 ¶ [0025] ("According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc.

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		In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols.”). Shieh ’088 ¶ [0026] (“The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”). Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing

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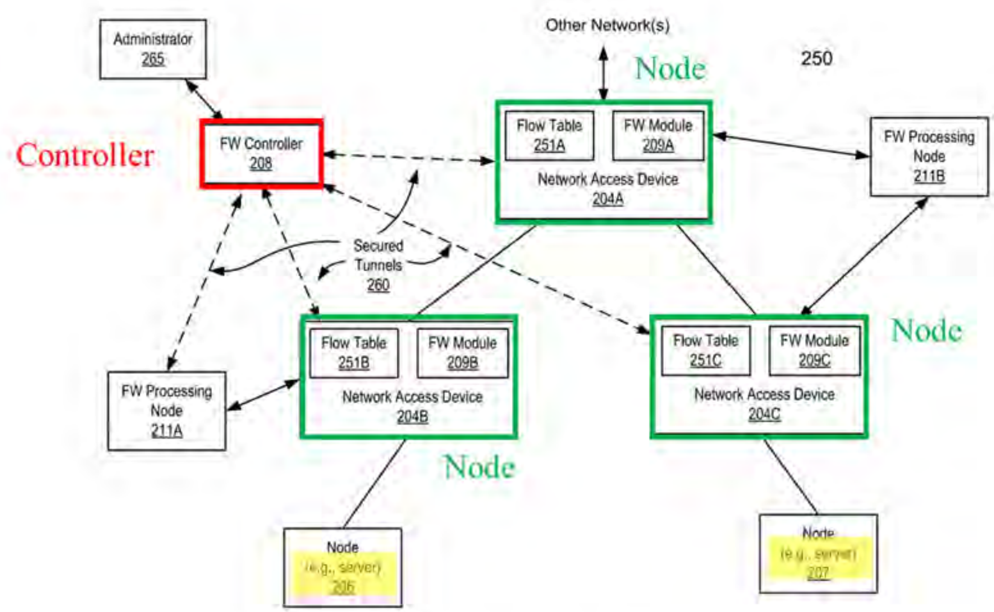
		nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”).  FIG. 2A Fig. 2A (annotation added) Shieh ’088 ¶ [0029] (“According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment, controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B,

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		whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”). Shieh ’088 ¶ [0035] (“An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on.”). Shieh ’088 ¶ [0036] (“During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Shieh ’088 ¶ [0049] (“In one embodiment, firewall modules 300A-300B could be distributed in different networks, even on different locations, as long as the modules can reach the module that is next in terms of processing and the central controller. In one embodiment, virtual I/O modules and corresponding security processing modules are in a public cloud and the central controller is in a private cloud. This configuration may provide the flexibility to secure and control packets coming from the public cloud, and allow central controller having overall view of traffic from Internet as well as from internal network.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the

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		references identified in element 2[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Chua discloses programming network nodes with blocking programmed actions. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header”) Chua at 28:7-32 (“In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data,

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		forward packets of the packet flow to a destination of the packet flow, forward packets of malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.”) As another example, Copeland discloses terminating rules configured on the network device. Copeland at [0057] (“In accordance with an aspect of the invention, a flow is considered terminated after a predetermined period of time has elapsed on a particular connection or port. For example, if HTTP Web traffic on port 80 ceases for a predetermined period of time, but other traffic begins to occur on port 80 after the expiration of that predetermined time period, it is considered that a new flow has begun, and the system responds accordingly to assign a new flow number and track the statistics and characteristics thereof. In the disclosed embodiment, the predetermined time period is 330 seconds, but those skilled in the art will understand that this time is arbitrary and may be heuristically adjusted.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”)

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		Copeland at [0093] ("As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.") Copeland at [0095] ("When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.") Copeland at [0099] ("As another example, if a particular host sends a large number of SYN packets to a target host and in response receives numerous R packets from the targeted host, a potential TCP probe is indicated. Likewise, numerous UDP packets sent from one host to a targeted host and numerous ICMP "port unavailable" packets received from the targeted host indicate a potential UDP probe. A stealth probe is indicated by multiple packets from the same source port number sent to different port numbers on a targeted host.") Copeland at [0107] ("A flow is terminated if no communications occur between the two IP addresses and the one low port (e.g. port 80) for 330 seconds. Most Web browsers or a TCP connec-tion send a reset packet (i.e. a packet with the R flag set) if no communications are sent or received for 5 minutes. An analysis can determine if the flow is abnormal or not for HTTP communications.") Copeland at [0123] ("Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.") Copeland at [0145] ("A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted

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		based on the sample rate or other means to enhance the accuracy making the number of hosts scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.”) Copeland at [0158] (“Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.”)

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3[a]	The method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction, and	Shieh ’088 discloses wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction. *See supra at* 1[a].
3[b]	upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller.	Shieh ’088 discloses upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller. For example, Shieh ’088 discloses an external controller that controls network nodes in a packet network, and identifies a command sent by the controller to the network access devices through a persistent connection to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device. A person of ordinary skill would understand that such demands could include a mirror command. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, upon receiving by the network node the ‘mirror' instruction and responsive to the packet satisfying the criterion, method further comprising sending the packet, by the network node, to the second entity and to the controller would have been obvious to a person having ordinary skill in the art, as explained below.

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		Shieh '088 ¶ [0017] ("According to some embodiments, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function that performs the distribution of network traffic; and 2) a security-processing function that performs security processing, including security inspection and policy enforcement. The IO function receives the packets and uses a session table to forward the packets to the security-processing function. A session table is a data structure that stores connection states, including the destination of the security-processing function. In one embodiment, the IO function determines, based on an internal data structure such as a session or flow table, whether the packet should be forwarded to the security processing function for security inspection. The configuration of the IO function to control whether to forward the packets to the security processing function can be set based on a command received from an administrator or alternatively, based on a signal received from the security processing function."). Shieh '088 ¶ [0018] ("According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.") Shieh '088 ¶ [0023] ("According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session

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		or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.”) Shieh ’088 ¶ [0025] (“According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols.”). Shieh ’088 ¶ [0026] (“The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”). Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a

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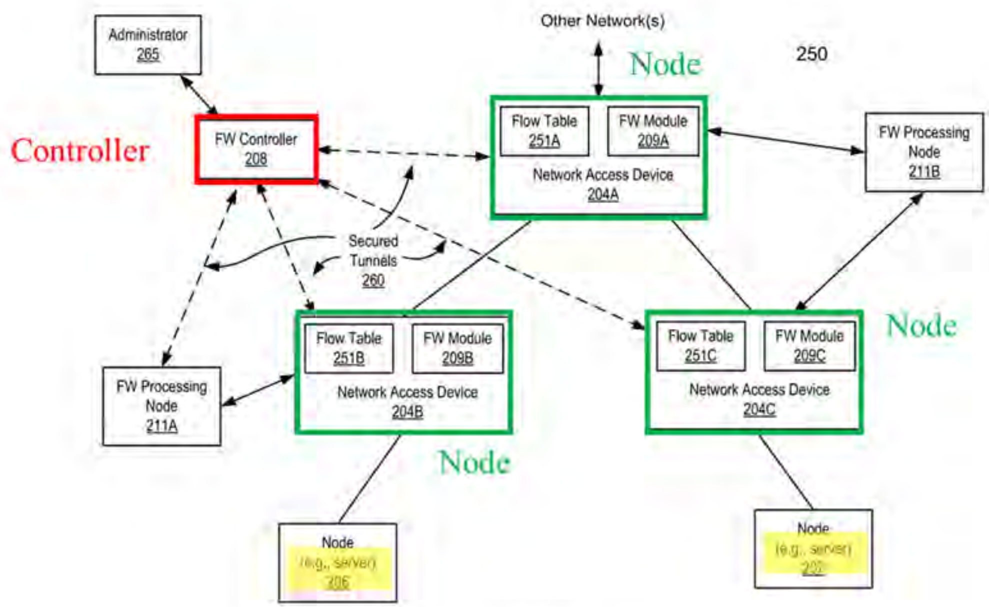
		firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintain a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.").  FIG. 2A Fig. 2A (annotation added)

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		Shieh '088 ¶ [0029] ("According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment, controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B, whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session."). Shieh '088 ¶ [0035] ("An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on."). Shieh '088 ¶ [0036] ("During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes."). Shieh '088 ¶ [0049] ("In one embodiment, firewall modules 300A-300B could be distributed in different networks, even on different locations, as long as the modules can reach the module that is next in terms of processing and the central controller. In one embodiment, virtual I/O

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		modules and corresponding security processing modules are in a public cloud and the central controller is in a private cloud. This configuration may provide the flexibility to secure and control packets coming from the public cloud, and allow central controller having overall view of traffic from Internet as well as from internal network.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 3[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ’088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 3(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Chua discloses a mirror program in response to an indication based on the packet header in which the network devices mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106

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		Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header”) Chua at 16:23-44 (“More particularly, control unit 130 may configure any of service devices 116 to send data representative of a particular event to SDN controller 112, and control unit 130 may auto-matically reprogram one or more network devices of SDN 106 in response to such data. For example, security monitor-ing applications of service devices 116 may determine that a specific source port, destination port, source IP address, des-tination IP address, or the like should be acted upon. Alter-natively, security monitoring applications may determine that, due to content or deep packet inspection, a specific type of traffic is malicious and should be blocked. In either case, the corresponding one of service devices 116 may send a message to SDN controller 112 representative of these deter-minations. As yet another example, a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics. SDN controller 112 may respond by programming network devices of SDN 106 to perform a programmed action, such as allowing corresponding traffic, blocking corresponding traf-fic, mirroring corresponding traffic, redirecting correspond-ing traffic.”) Chua at 28:7-32 (“In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data, forward packets of the packet flow to a destination of the packet flow, forward packets of

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		malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.”) As another example, Swenson discloses a counting mode instructed by the network controller to the steering device for monitoring and optimizing, in which the steering device forwards the packet flow to the user device/origin server and at the same time, sending the packet flow to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored

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		further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0064] (“Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of

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		flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net-work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.") Swenson at [0071] ("After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.") Swenson at [0072] ("In one embodiment, if the video optimizer 150 failed to retrieve user requested video file from the origin server 160, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 624, which is intercepted by the steering device 130 only. The steering device 130 forwards the video to the user device 110 and at the same time reports the flow size to the network controller 140 for monitoring purpose.")

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4[a]	The method according to claim 1, wherein the instruction is 'probe', 'mirror', or 'terminate' instruction, and	Shieh '088 discloses wherein the instruction is 'probe', 'mirror', or 'terminate' instruction. *See supra at* 1[a].

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4[b]	upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller;	Shieh ’088 discloses upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller. For example, Shieh ’088 discloses an external controller that controls network nodes in a packet network, and identifies a command sent by the controller to the network access devices through a persistent connection to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device. A person of ordinary skill would understand that such demands are probe commands. Shieh ’088 further discloses that when the central controller receives the packet, it decides which of the security processing modules is able to process the packets, and then forwards the packets to the designated security processing module. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Shieh ’088 ¶ [0017] (“According to some embodiments, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function that performs the distribution of network traffic; and 2) a security-processing function that performs security processing, including security inspection and policy enforcement. The IO function receives the packets and uses a session table to forward the packets to the security-processing function. A session table is a data structure that stores connection states, including the destination of the security-processing function. In one embodiment, the IO function determines, based on an internal data structure such as a session or flow table, whether the packet should be forwarded to the security processing function for security inspection. The configuration of the IO function to control whether to forward the packets to the security processing function can be set based on a command received from an administrator or alternatively, based on a signal received from the security processing function.”). Shieh ’088 ¶ [0018] (“According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of

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		filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.") Shieh '088 ¶ [0023] ("According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.") Shieh '088 ¶ [0025] ("According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary

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		and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols.”). Shieh '088 ¶ [0026] (“The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”). Shieh '088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”).

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		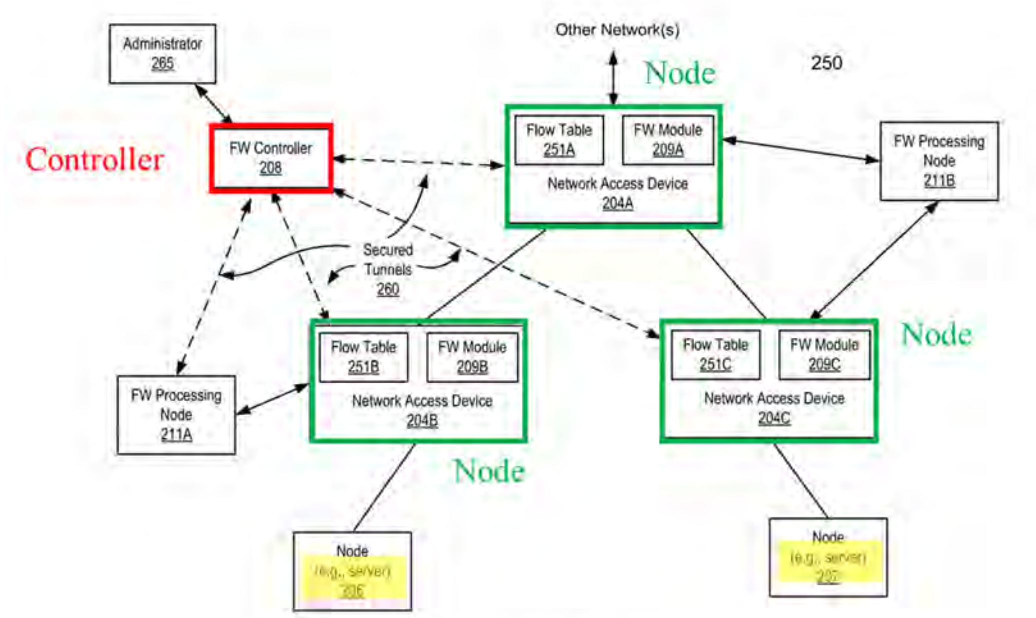 FIG. 2A Fig. 2A (annotation added) Shieh ’088 ¶ [0029] (“According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment, controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B, whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection

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		on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session."). Shieh '088 ¶ [0035] ("An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on."). Shieh '088 ¶ [0036] ("During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes."). Shieh '088 ¶ [0042] ("In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache."). Shieh '088 ¶ [0049] ("In one embodiment, firewall modules 300A-300B could be distributed in different networks, even on different locations, as long as the modules can reach the module

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		that is next in terms of processing and the central controller. In one embodiment, virtual I/O modules and corresponding security processing modules are in a public cloud and the central controller is in a private cloud. This configuration may provide the flexibility to secure and control packets coming from the public cloud, and allow central controller having overall view of traffic from Internet as well as from internal network.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses sending the packet from the network element to the controller or another table, in response to the packet matching the action in the flow table. Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To

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		define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.") Kempf at [0050] ("FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.") Kempf at [0091] ("When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.")

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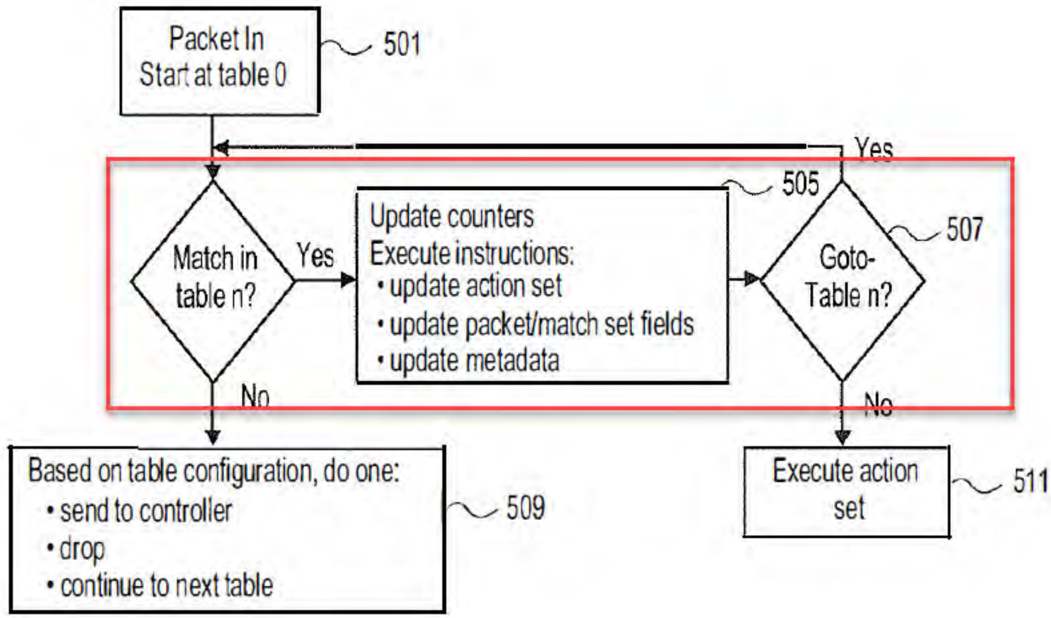
		Kempf at [0106] (“This encapsulates the packet and sends it to the OpenFlow controller.”) Kempf at Figure 5 (annotation added)  FIG. 5 Kempf at Figure 2 (annotation added)

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		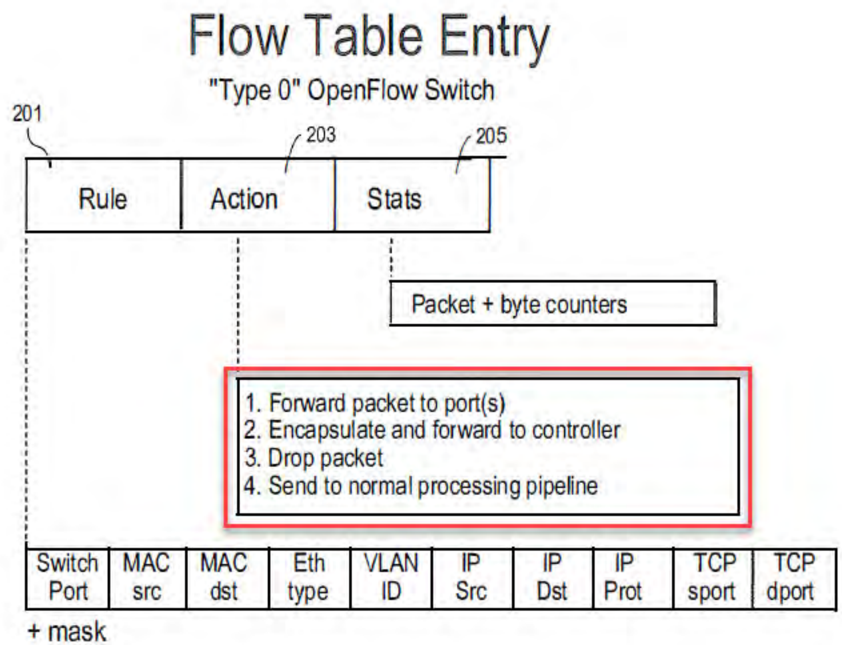 **FIG. 2** For example, Swenson discloses determining by the steering device monitors flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the packet to the network controller. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the

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		steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller

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		140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140

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		contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160.

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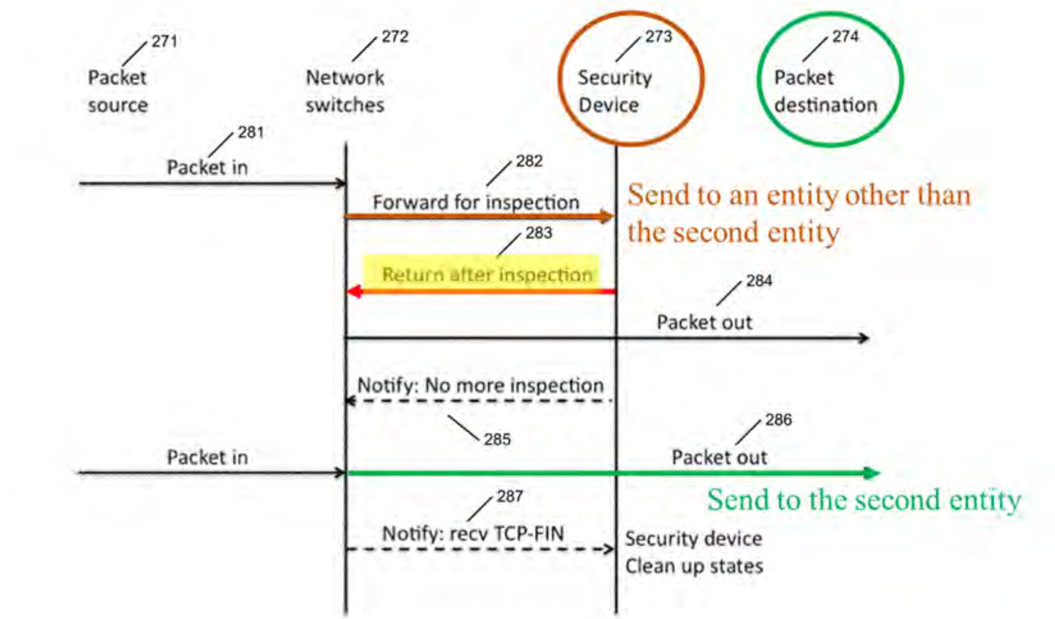
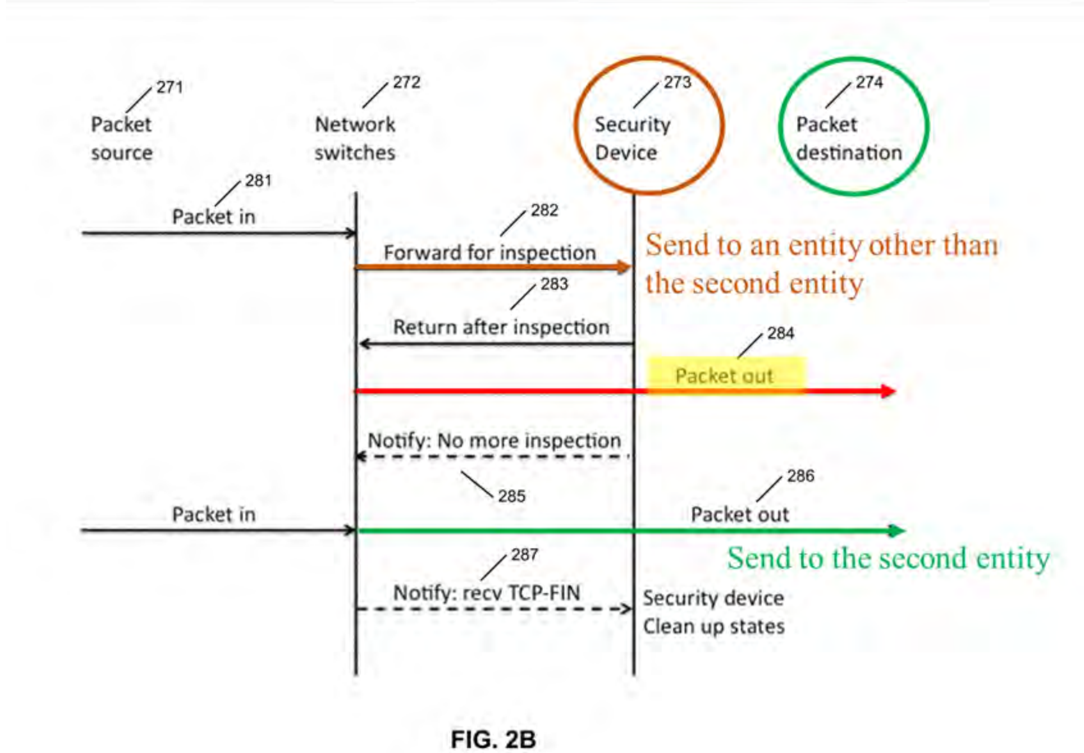
		The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.") Swenson at [0069] ("FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.")

No.	’111 Patent Claim 4	Shieh ’088
4[c]	responsive to receiving the packet, analyzing the packet, by the controller;	Shieh ’088 discloses responsive to receiving the packet, analyzing the packet, by the controller. For example, Shieh ’088 discloses that when the central controller receives the packet, it decides which of the security processing modules is able to process the packets, and then forwards the packets to the designated security processing module. Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”). Shieh ’088 ¶ [0042] (“In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache.”).

No.	’111 Patent Claim 4	Shieh ’088
4[d]	sending the packet, by the controller, to the network node; and	Shieh ’088 discloses sending the packet, by the controller, to the network node. For example, Shieh ’088 discloses, after being analyzed by the security device, returning the packet to the security device. Shieh ’088 ¶ [0037] “(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.”).

No.	'111 Patent Claim 4	Shieh '088
		 FIG. 2B Fig. 2B (annotation added)
4[e]	responsive to receiving the packet, sending the packet, by the network node, to the second entity.	Shieh '088 discloses responsive to receiving the packet, sending the packet, by the network node, to the second entity. For example, Shieh '088 discloses routing the security device-approved packet to the packet destination. Shieh '088 ¶ [0037] "(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source

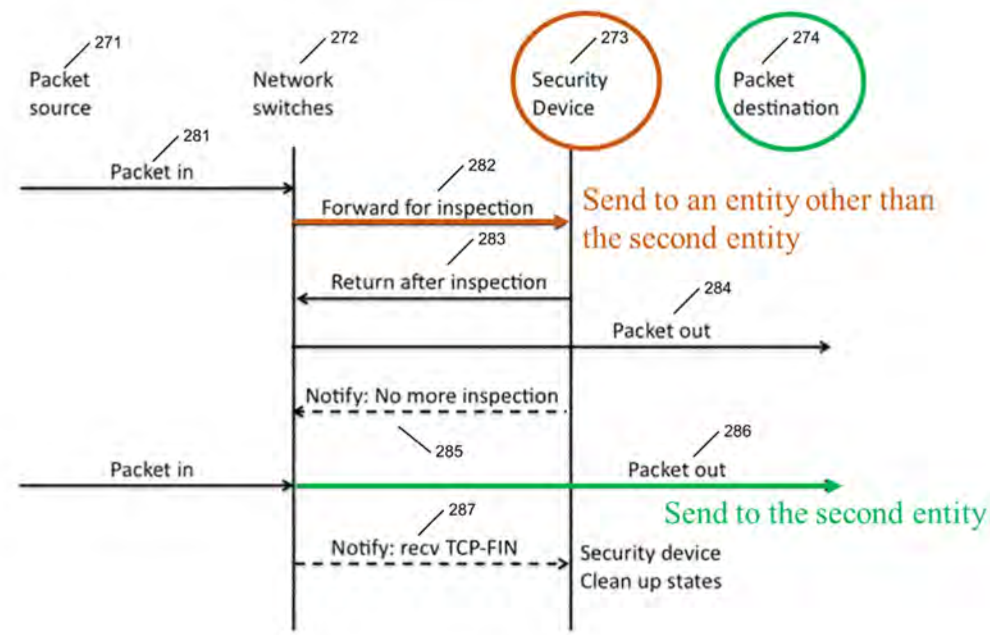
No.	'111 Patent Claim 4	Shieh '088
		node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.").

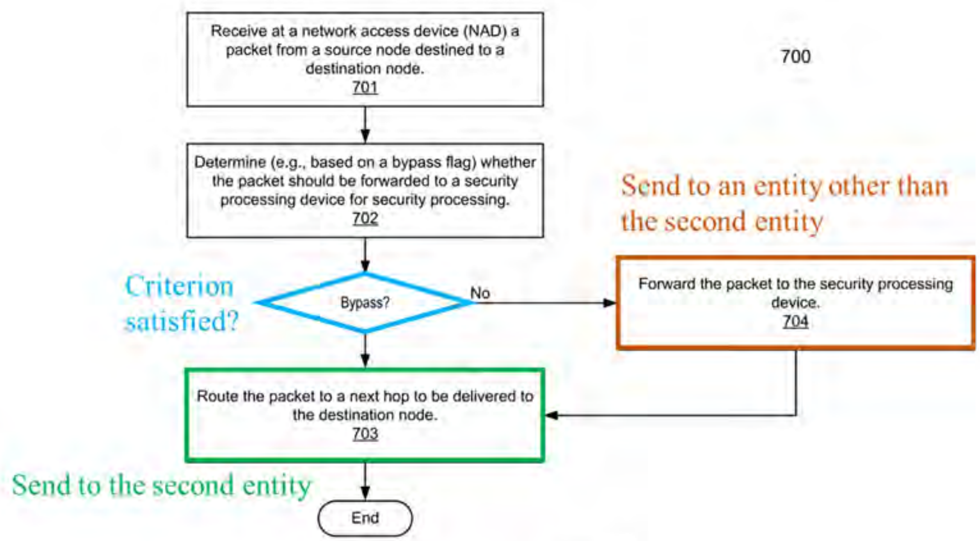
No.	'111 Patent Claim 4	Shieh '088
		 Fig. 2B (annotation added)

No.	'111 Patent Claim 5	Shieh '088
5	The method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the	Shieh '088 discloses the method according to claim 1, responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller. For example, Shieh '088 discloses bypass rules, such as when the bypass flag matches a predetermined value, that when satisfied, instructs that the packet will be sent from the virtual I/O module to a central controller capable of deep packet inspection responsive to the instruction. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Shieh '088 is found to not meet this

No.	’111 Patent Claim 5	Shieh ’088
	network node, to the controller.	limitation, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at 1. Shieh ’088 ¶ [0042] (“In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache.”). Shieh ’088 ¶ [0039] “(An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the forwarding table. If it cannot find the connection in its local cache, the packets are forwarded to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets.”).

No.	’111 Patent Claim 5	Shieh ’088
		Shieh ’088 ¶ [0036] “(During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Shieh ’088 ¶ [0037] “(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.”).

No.	'111 Patent Claim 5	Shieh '088
		 Fig. 2B (annotation added) Shieh '088 Claim 1 ("A computer-implemented method, comprising: receiving at a network access device a packet from a source node destined to a destination node; examining a data structure maintained by the network access device to determine whether the data structure stores a data member having a predetermined value, the data member indicating whether the packet should undergo security processing; if the data member matches the predetermined value, transmitting the packet to a security device associated with the network access device to allow the security device to perform content inspection, and in response to a response received from the security device, routing the packet to the destination node dependent upon the response; and

No.	’111 Patent Claim 5	Shieh ’088
		transmitting the packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value.”).  FIG. 7 Fig. 7 (annotation added) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ’088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 5 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index. Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream

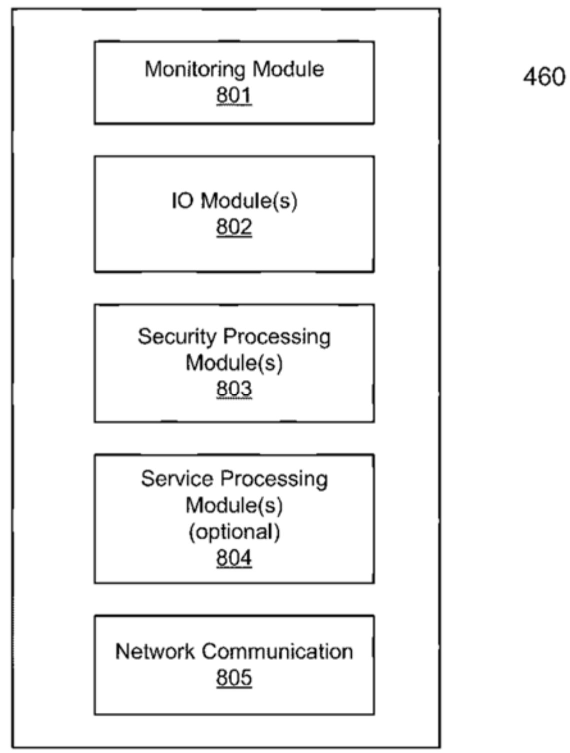
No.	'111 Patent Claim 5	Shieh '088
		such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.") Copeland [0079] ("Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.") Copeland at [0097] ("The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.") Copeland at [0120] ("The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled packets, and other information avail-able from the sFlow data stream that may be important. For example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.")

No.	’111 Patent Claim 5	Shieh ’088
		Copeland at [0126]-[0129] (“If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”) Copeland at [0144] (“Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”) Copeland at [0159]-[0162] (“A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and:

No.	'111 Patent Claim 5	Shieh '088
		(a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).")

No.	'111 Patent Claim 6	Shieh '088
6	The method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory.	Shieh '088 discloses the method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory. For example, Shieh '088 instructs the virtual I/O module to create a local cache to store connection state information. A person of ordinary skill in the art would understand that the controller also stores packet information in memory. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Shieh '088 is found to not meet this limitation, further comprising storing the received packet or a portion thereof, by the controller, in a memory would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at 5. Shieh '088 ¶ [0039] ("An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the

No.	'111 Patent Claim 6	Shieh '088
		forwarding table. If it cannot find the connection in its local cache, the packets are forwarded to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets."). Shieh '088 ¶ [0042] ("In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache."). Shieh '088 ¶ [0060] ("Some portions of the preceding detailed descriptions have been presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the ways used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of operations leading to a desired result. The operations are those requiring physical manipulations of physical quantities."). Shieh '088 ¶ [0057] ("Referring to FIG. 8, the memory 460 includes a monitoring module 801 which when executed by a processor is responsible for performing traffic monitoring of traffic from the VMs as described above. Memory 460 also stores one or more IO modules 802 which, when executed by a processor, is responsible for performing forwarding inbound and outbound packets. Memory 460 further stores one or more security processing modules 803 which, when executed by a processor, is responsible for security processes on the packets provided by IO modules 802. Memory 460 also stores one or more optional service processing modules 804, which when executed by a processor performs a

No.	’111 Patent Claim 6	Shieh ’088
		particular security process on behalf of security processing modules 803. The memory also includes a network communication module 805 used for performing network communication and communication with the other devices (e.g., servers, clients, etc.).”).  FIG. 8 Fig. 8

No.	’111 Patent Claim 6	Shieh ’088
		Shieh ’088 Claim 17 (“The system of claim 15, further comprising a controller to manage the network access device and the security device, wherein the network access device is further to receive a message having a data value from the controller, the data value indicating whether the network access device should forward further packets to the security device for security inspection, and store the data value in the data member of the data structure.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ’088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 6 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses the network controller storing historical network traffic data based on received packet flows. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other

No.	'111 Patent Claim 6	Shieh '088
		embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0029] ("As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.") Swenson at [0044] ("Additionally, historical flow data over a longer term helps the flow analyzer 312 to determine repeating patterns and heat-maps of certain network sections and to predict when they are under congestion. In this case, the flow statis-tics stored in the flow cache 322 can be mapped against traffic categories for analysis, for example, long-term running aver-ages of video flow bandwidth help determine suitability for optimization. Furthermore, estimated bandwidth per user (or per cell-ID, per tower, or per router) over time may be metrics calculated by the flow analyzer 312 in order to determine short term needs for optimization. For example, the flow analyzer 312 may determine to being optimizing flows asso-ciated with a particular cell-ID (or those flows for identified high-bandwidth users on

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		the cell-ID) in response to a thresh-old number of high-bandwidth users connecting to a same cell tower corresponding to the cell-ID. The reason why flow analyzer 312 selectively monitors large flows lies in the real-ization that TCP statistics for small objects, which make up most web flows, can be misleading and cause huge errors in throughput estimations.”) Swenson at [0046] (“The flow cache 322 stores monitored flow informa-tion, which is updated for a flow with each associated trans-action from the steering device 13 0. In one embodiment, data in the flow cache is stored in a map indexed by a hash, which can be up to 64-bit or longer. An entry in the flow cache map may be organized as a linked list to allow hash collisions. Alternatively, fewer bits in the hash index can also be used to speed up binary search in the flow cache map. For example, instead of using 64-bit hash index, which requires at worst 64 steps to find a node, the hash index can be reduced to 16-24 bits. There will be more hash collisions, hence the longer linked list. Other embodiments may use other type of maps or binary trees instead of the linked list to further optimize the hash collision searches.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an

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		estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.") For example, Chua '877 discloses logging and storing the packets, representative data of the packets, paths, and programs. Chua '877 at 7:28-54 ("SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow

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		Encapsulate-encapsulate packets in the network flow with a particular header”) Chua ‘877 at 7:55-61 (“SDN controller 112 may also log the programmed actions and information used to make the enforcement decisions, present the information to administrator 114 (or other user), and/or export data representative of the logs or results to a third party application, which may or may not include the application that sent an event that triggered SDN controller 112 to enforce a new policy.”) Chua ’877 at 21:32-52 (“As another example, switch 210 is communicatively coupled to IDS 214 via connections 224, 226. Connection 224 may represent port 9, while connection 226 may represent port 10. After SDN controller 218 determines that a particular packet flow should be inspected for intrusion detection, SDN controller 218 may program switch 210 to direct packets of the packet flow to IDS 214. SDN controller 218 may further configure IDS 214 to send data back to switch 210, such as data indicating whether packets of the packet flow represent a network attack and/or data of the packet flow after the data has been inspected. In some examples, data of the packet flow representing an attack may be dropped or forwarded to a containment device, rather than being forwarded along the original packet flow. The data indicating whether the packet flow represents an attack may be forwarded back to SDN controller 218, to admin workstation 220, to one of web clients 202, or to another device, e.g., for report generation. The device that receives the data, e.g., SDN controller 218, may generate and/or present a report indicative of malicious traffic to a user, e.g., via admin workstation 220.”) Chua ‘877 at 25:32-52 (“In the e\xample of FIG. 5, SDN controller 112 determines zones for packet flows through the network devices forming the SDN (304). The zones generally correspond to packet flows, that is, paths through the SDN followed by particular packets. SDN controller 112 may store data defining the zones in the data model discussed above. The data defining the zones may specify entities (e.g., users, devices, or the like) that have access to each zone. Thus, SDN controller 112 may program network devices of the SDN such that entities that are not authorized to access a particular zone are prevented from accessing the zone. SDN controller 112 may specify a zone using packet header field values, such as a source port, a destination port, a source IP address, a destination IP address, a virtual local area network (VLAN) tag, multiprotocol label switching (MPLS) labels, a packet protocol, and/or an IP subnet. In some cases, SDN controller 112 may specify whether a corresponding

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		packet flow for a zone is suspect or malicious and construct the zone such that packets of the packet flow are prevented from reaching an intended destination. As noted above, zones may be ordered based on priority values when overlap occurs.")

No.	'111 Patent Claim 7	Shieh '088
7	The method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.	Shieh '088 discloses responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller. For example, Shieh '088 discloses analyzing only certain bits in a packet to determine whether to forward packets for security processing or to allow the packets to proceed to the destination node, and thus permits only sending the portion to be analyzed to the controller. Shieh '088 discloses that its system may look for TCP FIN or TCP RST packets when applying the bypass rule, and these packets would have been identified by examining whether a FIN flag bit was set or a RST flag was set. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Shieh '088 is found to not meet this limitation, further comprising responsive to the packet satisfying the criterion and to instruction, sending a portion of the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at 5. Shieh '088 ¶ [0035] ("An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on.").

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		Shieh ’088 ¶ [0036] “(During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Shieh ’088 ¶ [0037] “(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ’088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 7 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example.

No.	’111 Patent Claim 7	Shieh ’088
		For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index. Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.”) Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0120] (“The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled packets, and other information avail-able from the sFlow data stream that may be important. For example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some

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		environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.”) Copeland at [0126]-[0129] (“If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”) Copeland at [0144] (“Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection

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		system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”) Copeland at [0159]-[0162] (“A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and: (a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”)

No.	’111 Patent Claim 8	Shieh ’088
8[a]	The method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes, and	Shieh ’088 discloses wherein the portion of the packet consists of multiple consecutive bytes. For example, Shieh ’088 discloses analyzing only certain bits in a packet to determine whether to forward packets for security processing or to allow the packets to proceed to the destination node, and thus permits only sending the portion to be analyzed to the controller. Shieh ’088 discloses that its system may look for TCP FIN or TCP RST packets when applying the bypass rule, and these packets would have been identified by examining whether a FIN flag bit was set or a RST flag was set. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, further comprising responsive to the packet satisfying the criterion and to instruction, sending a portion of the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at 7. Shieh ’088 ¶ [0035] (“An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-

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		processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on.”). Shieh ’088 ¶ [0036] “(During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Shieh ’088 ¶ [0037] “(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from

No.	’111 Patent Claim 8	Shieh ’088
		security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.”). Shieh ’088 at [0060] (“Some portions of the preceding detailed descriptions have been presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the ways used by those skilled in the data processing arts to most effectively convey the Substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of operations leading to a desired result. The operations are those requiring physical manipulations of physical quantities.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 8(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses consecutive bytes of a packet header field. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a

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		GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are

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		pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”)

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		For example, Copeland discloses fragmenting packets into smaller byte sizes, including headers and flags. Copeland further discloses sending sampled packet headers, consisting of fragmented packets of consecutive bytes to the monitoring device. Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”)
8[b]	wherein the instruction comprises identification of the consecutive bytes in the packet.	For example, Shieh ’088 discloses analyzing only certain bits in a packet to determine whether to forward packets for security processing or to allow the packets to proceed to the destination node, and thus permits only sending the portion to be analyzed to the controller. Shieh ’088 discloses that its system may look for TCP FIN or TCP RST packets when applying the bypass rule, and these packets would have been identified by examining whether a FIN flag bit was set or a RST flag was set. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, further comprising responsive to the packet satisfying the criterion and to instruction, sending a portion of the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at 7. Shieh ’088 ¶ [0035] (“An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on.”).

No.	’111 Patent Claim 8	Shieh ’088
		Shieh ’088 ¶ [0036] “(During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Shieh ’088 ¶ [0037] “(FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.”). Shieh ’088 at [0060] (“Some portions of the preceding detailed descriptions have been presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the ways used by those skilled in the data processing arts to most effectively convey the Substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a

No.	’111 Patent Claim 8	Shieh ’088
		self-consistent sequence of operations leading to a desired result. The operations are those requiring physical manipulations of physical quantities.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 8(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses rules in which the flow table includes matching to the consecutive bytes of a packet header. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”)

No.	’111 Patent Claim 8	Shieh ’088
		Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP

No.	’111 Patent Claim 8	Shieh ’088
		TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0101] (“In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)”) For example, Copeland discloses identifying the sampled packet headers comprised of fragmented packets of smaller byte sizes. Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented.

No.	'111 Patent Claim 8	Shieh '088
		The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.") Copeland at [0080] ("After the fragmentation information, an 8-bit time to live field specifies the remaining life of a packet and is decremented each time the packet is relayed. If this field is 0, the packet is destroyed. Next is an 8-bit protocol field that specifies the transport protocol used in the data portion. The following 16-bit field is a header checksum on the header only. Finally, the last two fields illustrated contain the 32-bit source address and 32-bit destination address. IP packet data follows the address information.") Copeland at [0081] ("In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.")

No.	'111 Patent Claim 9	Shieh '088
9	The method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller.	Shieh '088 discloses the method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller. For example, Shieh '088 discloses that when the central controller receives the packet, it decides which of the security processing modules is able to process the packets, and then forwards the packets to the designated security processing module. Shieh '088 ¶ [0028] ("Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content

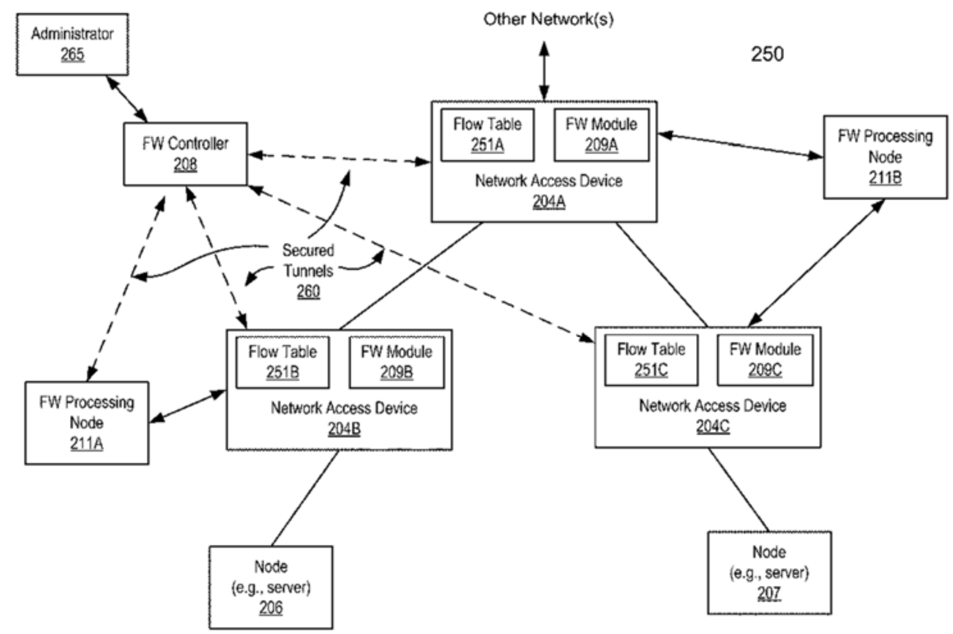
No.	’111 Patent Claim 9	Shieh ’088
		inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”). Shieh ’088 ¶ [0042] (“In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache.”).

No.	’111 Patent Claim 12	Shieh ’088
12	The method according to claim 9, wherein the analyzing comprises applying security or data analytic application.	Shieh ’088 discloses the method according to claim 9, wherein the analyzing comprises applying security or data analytic application. For example, Shieh ’088 discloses that the controller analyzes a received packet, in which the analysis performed on the packets includes applying a security application. Shieh ’088 ¶ [0002] (“Embodiments of the present invention relate generally to network security. More particularly, embodiments of the invention relate to enabling network security with network equipment.”). Shieh ’088 ¶ [0017] (“According to some embodiments, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function that performs the distribution of network traffic; and 2) a security-processing function that performs security processing;

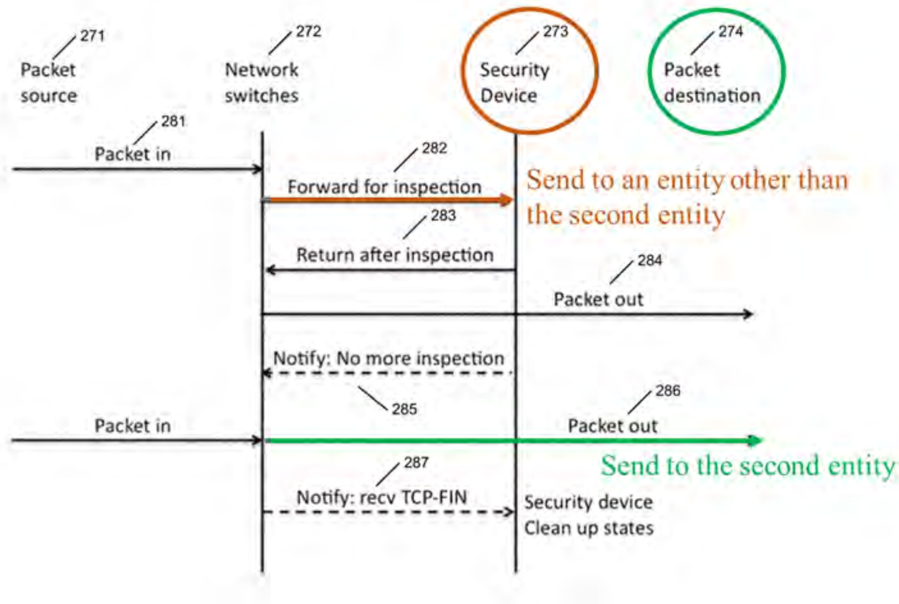
No.	’111 Patent Claim 12	Shieh ’088
		including security inspection and policy enforcement. The IO function receives the packets and uses a session table to forward the packets to the security-processing function. A session table is a data structure that stores connection states, including the destination of the security-processing function. In one embodiment, the IO function determines, based on an internal data structure such as a session or flow table, whether the packet should be forwarded to the security processing function for security inspection. The configuration of the IO function to control whether to forward the packets to the security processing function can be set based on a command received from an administrator or alternatively, based on a signal received from the security processing function.”). Shieh ’088 ¶ [0018] (“According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”). Shieh ’088 ¶ [0019] (“Advantages of embodiments of the present invention include, without limitation, providing a way to integrate partial network security functions into other network equipment, such as switches or routers. The integration allows network administrators to turn on security inspection functionality when there are needs for such, thus one can flexibly perform security inspection if needed. The notification between I/O functions and security-processing functions can reduce the number of packets to be inspected, thus enhancing the performance without lax the network security.”). Shieh ’088 ¶ [0021] (“According to one embodiment, network access device 204 is associated with a distributed firewall 212 that includes various firewall processing modules, for example, each being executed within a virtual machine (VM). In one embodiment, each firewall module is responsible for performing one or more firewall functions, but it does not include all of the firewall functions of a firewall. Examples of the firewall functions include,

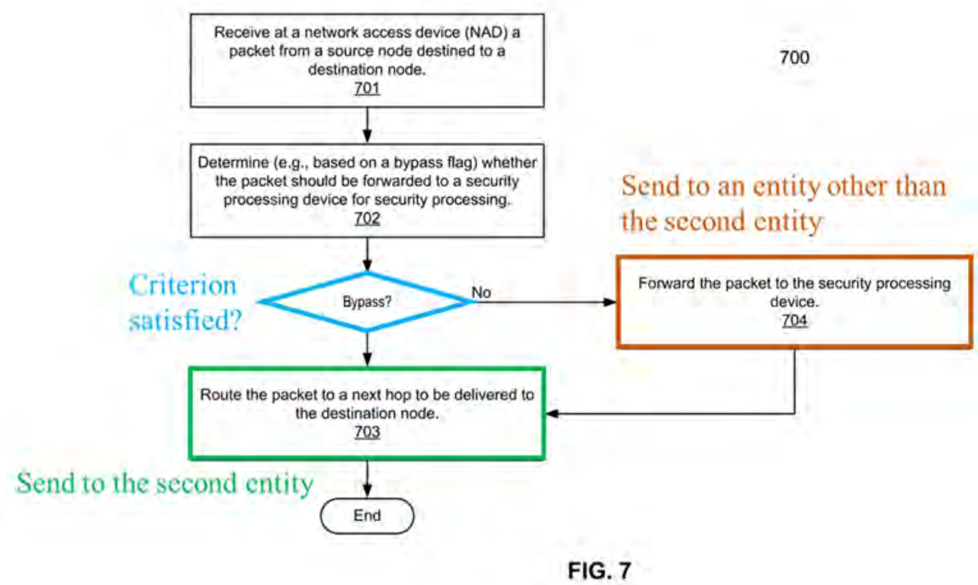
No.	’111 Patent Claim 12	Shieh ’088
		but are not limited to, network address translation (NAT), virtual private network (VPN), deep packet inspection (DPI), and/or anti-virus, etc. In one embodiment, some of the firewall processing modules are located within network access device 204 (e.g., firewall modules 209) and some are located external to network access device 204 (e.g., firewall modules 210 maintained by firewall processing node(s) 211, which may be a dedicated firewall processing machine. All of the firewall modules 209-210 are managed by firewall controller 208, which may be located within network access device 204, or external to network access device 204, such as, for example, in a public cloud associated with network 203, or in a private cloud associated with network 205. Controller 208 and firewall processing modules 209-210 collectively are referred to herein as distributed firewall 212.”). Shieh ’088 ¶ [0023] (“According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.”). Shieh ’088 ¶ [0029] (“According to one embodiment, an administrator 265 configures, for example, via a controller or a management entity 208, a network access device (e.g., network access devices 204A-204C) to set up a set of filtering rules concerning whether and/or what types of packets should be forwarded to a security device and which of the security devices (e.g., security devices 211A-211B) for security inspection. In this embodiment, controller 208 is configured to manage multiple network access devices 204A-204C and/or multiple security devices 211A-211B. Alternatively, a security device, such as security device 211A, may inform a network access device, such as network access device 204B,

No.	’111 Patent Claim 12	Shieh ’088
		whether subsequent packets of a particular session should be forwarded from the network access device for security inspection. A security device may perform the security inspection on packets at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.”). Shieh ’088 ¶ [0030] (“The configuration information may be stored in a memory or storage device of a network access device. In one embodiment, such configuration information may be stored as part of a flow table or session table as shown in FIG. 5. Referring to FIG. 5, a bypass flag 501 may be received from a security device indicating that the security device no longer wishes to receive further packets of the same session for security inspection. In addition, a security device may register certain notification events 502 with a network access device, such that when the network access device detects such events, it will notify the security device. Further, a set of one or more filtering rules 503 may be received from an administrator to filter and send only certain types of packets to a security device for inspection.”). Shieh ’088 ¶ [0031] (“According to one embodiment, referring back to FIG. 2A, when a security-processing function (e.g., processing node 211A) receives the packets, it does the security inspection and security policy enforcement. The packets then are forwarded to the next I/O function (e.g., modules 209A-209C). The choices of the next I/O function could be from the decision from layer 2 such as Ethernet MAC address lookup, or IP address routing, or other methods.”).

No.	’111 Patent Claim 12	Shieh ’088
		 FIG. 2A Fig. 2A Shieh ’088 ¶ [0035] (“An embodiment of the invention also controls the communication between I/O functions and security-processing functions to enable packets to bypass security-processing function if there is no more need to inspect the packets of the connection. Some of the security functions do not need to inspect all the packets of a connection. For examples, to identify the application of a connection, there may be only need to inspect first four or five packets to make the identification. In this case, the security-processing function can notify I/O functions to bypass the security-processing function for the rest of the packets of the connections. Once the I/O function receives the notification, it will forward the packets out without redirecting the packets to the security-processing functions. This would greatly improve the performance even when security inspection is turned on.”).

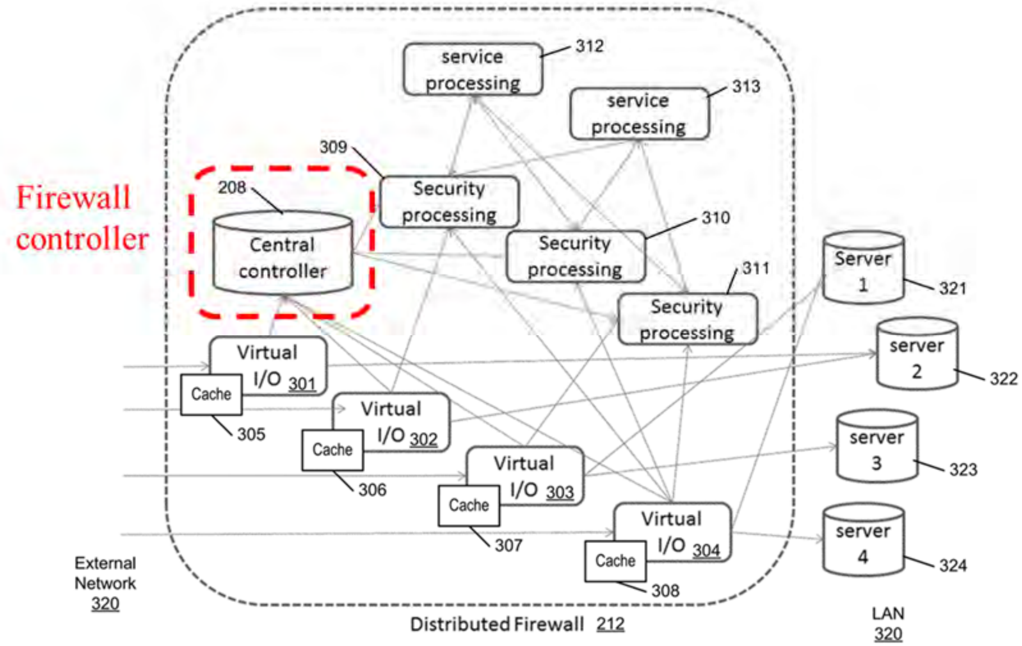
No.	'111 Patent Claim 12	Shieh '088
		Shieh '088 ¶ [0036] ("During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes."). Shieh '088 ¶ [0037] ("FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.").

No.	’111 Patent Claim 12	Shieh ’088
		 FIG. 2B Fig. 2B (annotation added) Shieh ’088 ¶ [0042] (“In one embodiment, central controller 208 is the central place to control forwarding of the packets amongst I/O modules 301-304, security processing modules 309-311, and service processing modules 312-313. When a virtual I/O module receives a packet, according to one embodiment, it forwards the packet to central controller 208 if it cannot find an existing connection in its local cache, as shown in FIG. 5. When central controller 208 receives the packet, it decides which of security processing modules 309-311 is able to process the packets, and then forwards the packets to the designated security processing module. It also instructs the virtual I/O module to create the local cache to store connection state information so the subsequent packets of the same connection session do not need to be forwarded to central controller 208; rather, they can be directly forwarded to the proper security processing module identified in the cache.”).

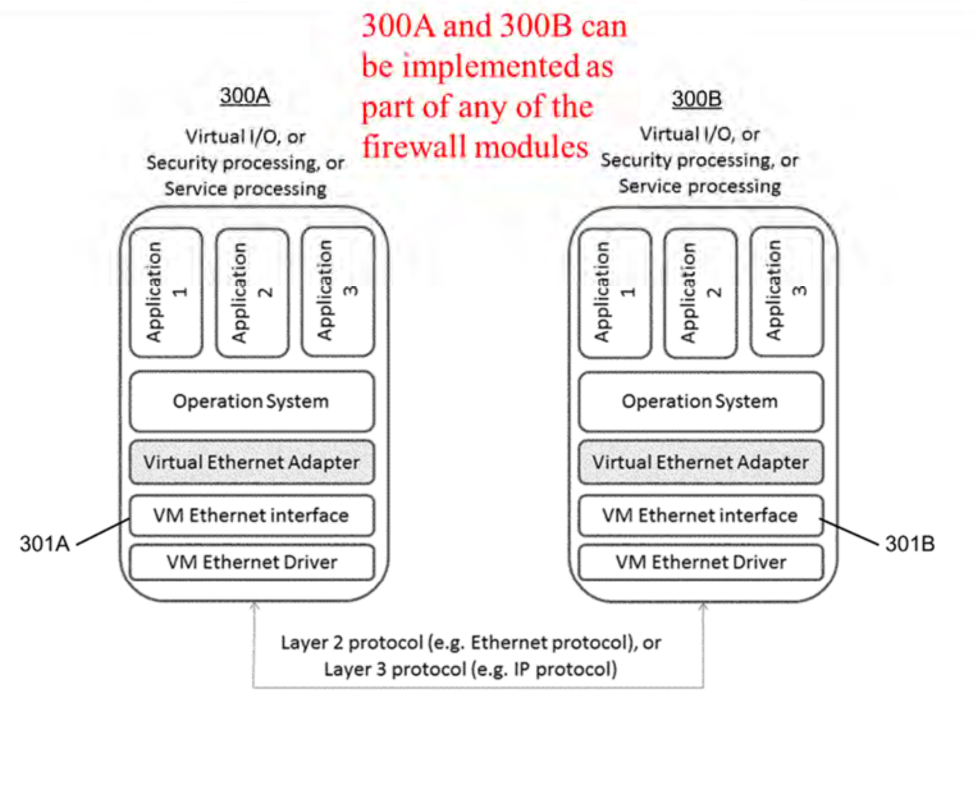
No.	’111 Patent Claim 12	Shieh ’088
		Shieh ’088 ¶ [0049] (“FIG. 7 is a flow diagram illustrating a method for performing firewall operations using a distributed firewall according to one embodiment of the invention. Method 700 may be performed by processing logic that may include software, hardware, or a combination of both. For example, method 700 may be performed by distributed firewall 212 of FIG. 1. Referring to FIG. 7, at block 701, a network access device receives a packet from a source node destined to a destination node. At block 702, the network access device determines whether the packet should be forwarded to a security device for security inspection. For example, processing logic may check whether there is an entry exists in a session table for the current session. If not, it may forward the packet to the security device for security processing at block 704. Alternatively, the processing logic may check whether there is a bypass flag set to a predetermined value for the current session. If there is, the packet will not be forwarded to the security device; instead, the packet will be directly routed to the destination node at block 703.”).  Fig. 7 (annotation added)

No.	’111 Patent Claim 13	Shieh ’088
13	The method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality.	Shieh ’088 discloses the method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality. For example, Shieh ’’088 discloses that its system analyzes packets by applying a security application that comprises firewall functionality. Shieh ’088 ¶ [0021] (“According to one embodiment, network access device 204 is associated with a distributed firewall 212 that includes various firewall processing modules, for example, each being executed within a virtual machine (VM). In one embodiment, each firewall module is responsible for performing one or more firewall functions, but it does not include all of the firewall functions of a firewall. Examples of the firewall functions include, but are not limited to, network address translation (NAT), virtual private network (VPN), deep packet inspection (DPI), and/or anti-virus, etc. In one embodiment, some of the firewall processing modules are located within network access device 204 (e.g., firewall modules 209) and some are located external to network access device 204 (e.g., firewall modules 210 maintained by firewall processing node(s) 211, which may be a dedicated firewall processing machine. All of the firewall modules 209-210 are managed by firewall controller 208, which may be located within network access device 204, or external to network access device 204, such as, for example, in a public cloud associated with network 203, or in a private cloud associated with network 205. Controller 208 and firewall processing modules 209-210 collectively are referred to herein as distributed firewall 212.”). Shieh ’088 ¶ [0023] (“According to one embodiment, a mechanism is utilized to dynamically perform security inspection in a network. In one embodiment, the mechanism includes two functions: 1) an input/output (IO) function (e.g., firewall module(s) 209) that performs the distribution of network traffic; and 2) a security-processing function (e.g., firewall module(s) 210) that performs security processing, including security inspection and policy enforcement. IO function 209 receives the packets and uses a session table to forward the packets to security-processing function 210. A session table is a data structure that stores connection states, including the destination of security-processing function. In one embodiment, IO function 209 determines, based on an internal data structure such as a session or flow table (e.g., session table as shown in FIG. 5), whether the packet should be forwarded to security processing function 210 for security inspection. The configuration of IO function 209 to control whether to forward the packets to security processing

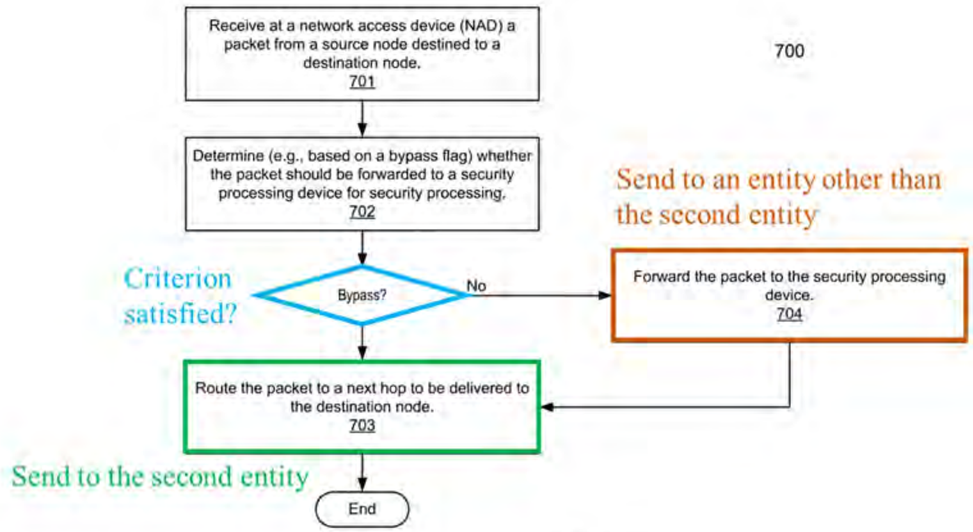
No.	’111 Patent Claim 13	Shieh ’088
		function 210 can be set based on a command received from an administrator or alternatively, based on a signal received from security processing function 210.”). Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C).”). Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”). Shieh ’088 ¶ [0038] (“FIG. 3 is a block diagram illustrating an example of a distributed firewall according to one embodiment of the invention. Referring to FIG. 3, distributed firewall 212 includes, for the purpose of illustration, four different types of modules: virtual I/O modules 301-304, security processing modules 309-311, service processing modules 312-313, and central controller 208. All these modules can run on the same virtual machine, or on different virtual machines, or on same or different physical hosts. In one embodiment, the communication protocol between the modules is IPC (inter-process communication) if they run on the same memory space, use layer-2 network protocol if they are on the same layer-2 network, or use IP protocols if they are connected through IP networks. Some or all of modules 301-304 and 309-313 may be executed within a virtual machine. Dependent upon the specific configuration, each of modules 301-304 and 309-313 may be executed by a respective virtual machine. In other configurations, multiple of modules 301-304 and 309-313 may be executed by the same virtual machine.”).

No.	'111 Patent Claim 13	Shieh '088
		 FIG. 3 Fig. 3 (annotation added) Shieh '088 ¶ [0043] ("By dividing a firewall into different modules, it allows putting virtual I/O and security processing functions at the best locations to protect the network entrance, while keeping the central control and monitoring functionality at the central controller. It also enhances the scalability of the system since all modules can be expanded to multiple instances to share the system load. Note that a service processing module is optional in the architecture, as it is only required when there are needs to use additional resources to handle the security functions."). Shieh '088 ¶ [0044] ("FIG. 6 is a block diagram illustrating architecture of a processing module according to one embodiment of the invention. Referring to FIG. 6, any of processing

No.	'111 Patent Claim 13	Shieh '088
		modules 300A and 300B can be implemented as part of any of the firewall modules (e.g., I/O module, security processing module, or service processing module) as shown in FIG. 3. In the example as shown in FIG. 6, multiple possible communication protocols can be utilized for the packet forwarding between firewall modules. If the firewall modules are on the same layer-2 networks, the packet can be forwarded through a layer-2 protocol, such as Ethernet protocol. In this example, it is assumed that each of firewall modules 300 a-300B has a dedicated virtual Ethernet interface (e.g., interfaces 301A and 301B) being used for the forwarding link and the packets are sent with Ethernet header of both sides' media access control (MAC) addresses. The packets can also be forwarded in a layer-3 protocol such as an IP protocol. During the layer-3 routing, original packets are encapsulated with another IP header, which carries the IP address of both sides. The encapsulation of the outer IP address would ensure the packets are sent, and received from the proper peer.").

No.	'111 Patent Claim 13	Shieh '088
		 **FIG. 6** Fig. 6 (annotation added) Shieh '088 ¶ [0045] ("In one embodiment, firewall modules 300A and 300B can run on virtual machines or physical hosts. Running on virtual machines provides additional benefit that a firewall module can be added dynamically. Initially the distributed firewall may have only one virtual I/O module, one security processing module, and a central controller. When there is more traffic coming, it can add more virtual I/O modules to support increasing connections. If it needs more CPU resources to handle the security processing, it may add more security processing modules and/or add more service processing modules, to support the increasing load. This provides lots of flexibility to support various network conditions.").

No.	’111 Patent Claim 13	Shieh ’088
		Shieh ’088 ¶ [0046] (“In one embodiment, firewall modules 300A-300B could be distributed in different networks, even on different locations, as long as the modules can reach the module that is next in terms of processing and the central controller. In one embodiment, virtual I/O modules and corresponding security processing modules are in a public cloud and the central controller is in a private cloud. This configuration may provide the flexibility to secure and control packets coming from the public cloud, and allow central controller having overall view of traffic from Internet as well as from internal network.”). Shieh ’088 ¶ [0047] (“One of the advantages of embodiments of the present invention includes, but not limited to, that the distributed firewall can employ a significantly large amount of CPU and memory resources for service processing and protect the networks at multiple geometric locations. The central controller decides which security processing module capable of processing particular connection, and is able to start a new security processing at the place deemed best for packet processing.”). Shieh ’088 ¶ [0048] (“As a result, the location of the packet I/O is not limited on a single appliance. The I/O modules can be placed anywhere as virtual machines. The security processing power is significantly higher as packets and connections can be load balanced to any number of the security processing modules, and the modules could be added or deleted dynamically. Using such modules in a firewall cloud provides a security design that is best-fit for the emerging cloud computing, and provides great scalability and system availability.”). Shieh ’088 ¶ [0049] (“FIG. 7 is a flow diagram illustrating a method for performing firewall operations using a distributed firewall according to one embodiment of the invention. Method 700 may be performed by processing logic that may include software, hardware, or a combination of both. For example, method 700 may be performed by distributed firewall 212 of FIG. 1. Referring to FIG. 7, at block 701, a network access device receives a packet from a source node destined to a destination node. At block 702, the network access device determines whether the packet should be forwarded to a security device for security inspection. For example, processing logic may check whether there is an entry exists in a session table for the current session. If not, it may forward the packet to the security device for security processing at block 704. Alternatively, the processing logic may check whether there is a bypass flag set to a predetermined value for the current session. If there is, the packet

No.	’111 Patent Claim 13	Shieh ’088
		will not be forwarded to the security device; instead, the packet will be directly routed to the destination node at block 703.”).  FIG. 7 Fig. 7 (annotation added)

No.	’111 Patent Claim 14	Shieh ’088
14	The method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet.	Shieh ’088 discloses the method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet. For example, Shieh ’088 discloses the use of deep packet inspection as part of the analysis functionality. Shieh ’088 ¶ [0021] (“According to one embodiment, network access device 204 is associated with a distributed firewall 212 that includes various firewall processing modules, for example, each being executed within a virtual machine (VM). In one embodiment, each

No.	’111 Patent Claim 14	Shieh ’088
		firewall module is responsible for performing one or more firewall functions, but it does not include all of the firewall functions of a firewall. Examples of the firewall functions include, but are not limited to, network address translation (NAT), virtual private network (VPN), deep packet inspection (DPI), and/or anti-virus, etc.”). Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response, firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”). Shieh ’088 ¶ [0040] (“In one embodiment, each of security processing modules 309-311 performs major security processing functions, such as, for example, NAT, VPN, DPI, and/or anti-virus, etc. A security processing module receives packets and runs the packets through one or more various security functions in the module for security processing. There could be several security modules and each handles the same or different security functions. If the packets need to go through another security or service processing, the module sends the packets to the other modules.”). Shieh ’088 ¶ [0041] (“In one embodiment, each of service processing modules 312-313 performs one or more of the functions of security processing module, such as, for example, NAT, VPN, DPI, and/or anti-virus, etc. However, it is different from the security processing module in that it only receives and sends packets to the same security processing module. If the tasks cannot be done in a security processing module, for example, due to a resource limitation, system load, or the requirement of a different operation system, the packets can be forwarded to one or more of service processing modules 312-313 for further

No.	’111 Patent Claim 14	Shieh ’088
		processing. The packets then are sent back to the same security processing module for the next security function processing. To further share the system load, any of security processing modules 309-311 can load balance the computational-intensive services using multiple service processing modules.”)

No.	’111 Patent Claim 15	Shieh ’088
15[a]	The method according to claim 9, wherein the packet comprises distinct header and payload fields, and	Shieh ’088 discloses the method according to claim 9, wherein the packet comprises distinct header and payload fields. For example, Shieh ’088 disclose deep packet inspection, which would be understood to require inspection of at least part of the payload field. A person of ordinary skill in the art would understand that a packet comprises distinct header and payload fields. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, wherein the packet comprises distinct header and payload fields would have been obvious to a person having ordinary skill in the art, as explained below. Shieh ’088 ¶ [0021] (“According to one embodiment, network access device 204 is associated with a distributed firewall 212 that includes various firewall processing modules, for example, each being executed within a virtual machine (VM). In one embodiment, each firewall module is responsible for performing one or more firewall functions, but it does not include all of the firewall functions of a firewall. Examples of the firewall functions include, but are not limited to, network address translation (NAT), virtual private network (VPN), deep packet inspection (DPI), and/or anti-virus, etc.”). Shieh ’088 ¶ [0028] (“Firewall modules 209A-209C may be part of a distributed firewall described above. For example, firewall modules 209A-209C may be the IO functions of a firewall while nodes 211A-211B may be firewall processing nodes. That is, modules 211A-211B may be dedicated firewall processing devices that perform some firewall processing operations such as DPI, content inspection, antivirus, etc., while firewall modules 209A-209C are responsible for routing data packets. For example, when firewall module 209B receives a packet from node 206, it may forward the packet to firewall processing node 211A for content inspection and/or forwards the packet to controller 208 for routing information. In response,

No.	’111 Patent Claim 15	Shieh ’088
		firewall processing node 211A analyzes the received packet and/or further communicates with controller 208. Controller 208 may provide further routing information back to network access device 204B regarding how to route the packet. Each of the firewall processing nodes 211A-211B may further maintains a persistent connection or tunnel with controller 208, for example, using the OpenFlow communication protocol.”). Shieh ’088 ¶ [0040] (“In one embodiment, each of security processing modules 309-311 performs major security processing functions, such as, for example, NAT, VPN, DPI, and/or anti-virus, etc. A security processing module receives packets and runs the packets through one or more various security functions in the module for security processing. There could be several security modules and each handles the same or different security functions. If the packets need to go through another security or service processing, the module sends the packets to the other modules.”). Shieh ’088 ¶ [0041] (“In one embodiment, each of service processing modules 312-313 performs one or more of the functions of security processing module, such as, for example, NAT, VPN, DPI, and/or anti-virus, etc. However, it is different from the security processing module in that it only receives and sends packets to the same security processing module. If the tasks cannot be done in a security processing module, for example, due to a resource limitation, system load, or the requirement of a different operation system, the packets can be forwarded to one or more of service processing modules 312-313 for further processing. The packets then are sent back to the same security processing module for the next security function processing. To further share the system load, any of security processing modules 309-311 can load balance the computational-intensive services using multiple service processing modules.”) Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 15(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses packet flows with header and payload fields.

No.	’111 Patent Claim 15	Shieh ’088
		Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0049] (“The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow

No.	’111 Patent Claim 15	Shieh ’088
		and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0064] (Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net- work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”)

No.	’111 Patent Claim 15	Shieh ’088
		Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video

No.	’111 Patent Claim 15	Shieh ’088
		or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0079] (“In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not

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		available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.")
15[b]	wherein the analyzing comprises checking part of, or whole of, the payload field.	Shieh '088 discloses wherein the analyzing comprises checking part of, or whole of, the payload field. For example, Shieh '088 discloses packet analysis, which includes checking the headers, which includes checking in whole or in part the payload field. A person of ordinary skill in the art would understand that deep packet inspection occurs on the payload field. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Shieh '088 is found to not meet this limitation, wherein the analyzing comprises checking part of, or whole of, the payload field would have been obvious to a person having ordinary skill in the art, as explained below. Shieh '088 ¶ [0036] ("During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes."). Shieh '088 ¶ [0039] "(An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a

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		packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the forwarding table. If it cannot find the connection in its local cache, the packets are forwarded to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 15(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses inspecting the payload of a packet flow. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The

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		user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0049] (“The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”)

No.	'111 Patent Claim 15	Shieh '088
		Swenson at [0064] (Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net- work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.") Swenson at [0065] ("FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.")

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		Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0079] (“In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other

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		embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)

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16[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Shieh ’088 discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* Claim 15[a].

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16[b]	the header comprises one or more flag bits, and	Shieh ’088 discloses that the header comprises one or more flag bits. For example, Shieh ’088 discloses header fields in a packet and how they are used to route packets. Shieh ’088 further discloses that the packet streams passing through its system include TCP FIN or TCP RST packets; a TCP FIN packet includes a FIN flag bit in its header that is set, and a TCP RST packet includes a RST flag bit in its header that is set. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, the header comprises one or more flag bits would have been obvious to a person having ordinary skill in the art, as explained below. Shieh ’088 ¶ [0036] (“During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet headers with flag bits. Copeland at Figure 2

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		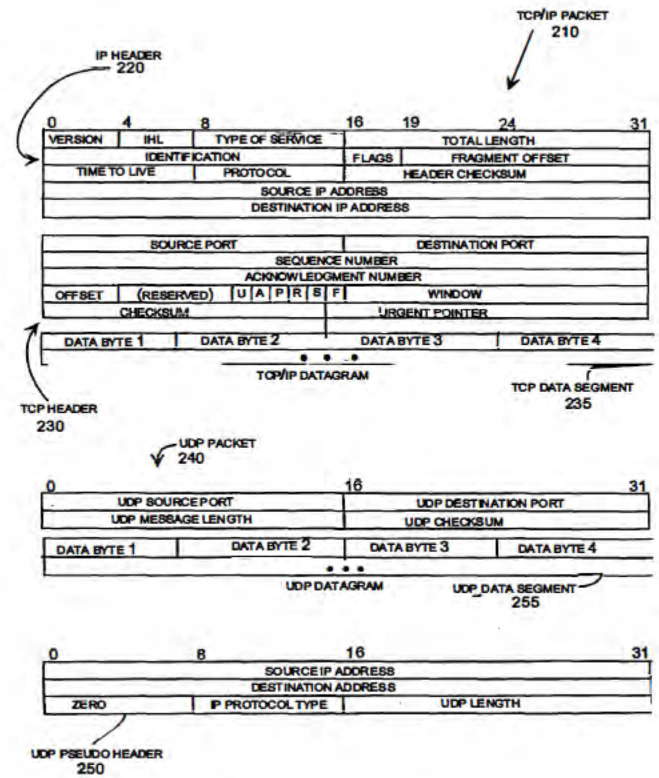 PACKET HEADERS FIG. 2 Copeland at [0076] ("FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.")

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		Copeland at [0077] (“The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.”) Copeland at [0078] (“In regards to a typical IP packet 210, the first 4 bits of the IP header 220 identify the Internet protocol (IP) version. The following 4 bits identify the IP header length in 32 bit words. The next 8 bits differentiate the type of service by describing how the packet should be handled in transit. The following 16 bits convey the total packet length.”) Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0083] (“Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The

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		checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.”) Copeland at [0116] (“These steps generally require manipulations of quantities such as IP addresses, packet length, header length, start times, end times, port numbers, and other packet related information. Usually, though not necessarily, these quanti-ties take the form of electrical, magnetic, or optical signals capable of being stored, transferred, combined, compared, or otherwise manipulated. It is conventional for those skilled in the art to refer to these signals as bits, bytes, words, values, elements, symbols, characters, terms, numbers, points, records, objects, images, files or the like. It should be kept in mind, however, that these and similar terms should be associated with appropriate quantities for computer opera-tions and that these terms are merely conventional labels applied to quantities that exist within and during operation of the computer.”) As another example, Kempf discloses packet headers with flag bits. Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough

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		that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper

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		two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

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		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_
		teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenFlow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		struct ermst__gtp__mask {
		uint32__t gtp__wildcard;
		uint16__t gtp__flag__mask;
		};
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

16[c]	wherein the packet-applicable criterion is that one or more of the flag bits is set.	Shieh ’088 discloses wherein the packet-applicable criterion is that one or more of the flag bits is set. For example, Shieh ’088 discloses that the packet streams passing through its system include TCP FIN or TCP RST packets; a TCP FIN packet includes a FIN flag bit in its header that is set, and a TCP RST packet includes a RST flag bit in its header that is set. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Shieh ‘088 is found to not meet this limitation, wherein the packet applicable criterion is that one or more of the flag bits is set would have been obvious to a person having ordinary skill in the art, as explained below. Shieh ’088 ¶ [0036] (“During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be

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		receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”). Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Shieh ‘088 in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[c] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet specific characteristics including flag bits that are set. Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”)

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		Copeland at [0083] (“Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”) Copeland at [0125] (“For purposes of the description, which follows, the IP address with the lower value, when considered as a 32-bit unsigned integer, is designated ip[0] and the corresponding port number is designated pt[0]. The higher IP address is designated ip[l] and the corresponding TCP or UDP port number is designated pt[l]. At some point, either pt[0] or pt[l] may be designated the "server" port by setting an appropriate bit in a bit map that is part of the flow record (record "state", bit 1 or 2 is set).”) Copeland at [0145] (“A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.”) As another example, Kempf flow table matches in which the flag bits is set, Kempf at [0081] (“In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID

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		flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02-Match the S field; and 0x0l-Match the PN field.”) Kempf at [0082] (“In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the

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		hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match

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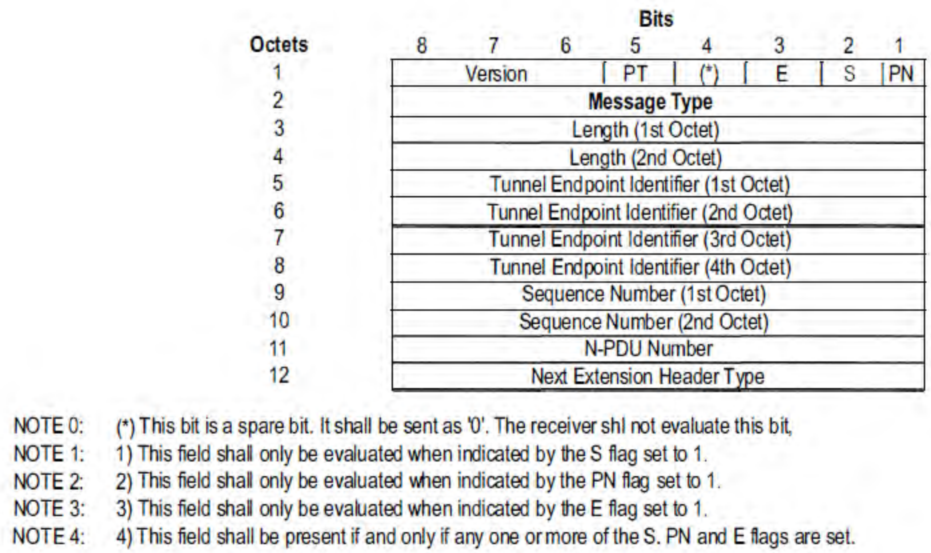
		the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”)
		
		Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenF!ow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		`struct ermst_gtp_mask {`
		`uint32_t gtp_wildcard;`
		`uint16_t gtp_flag_mask;`
		`};`
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

No.	’111 Patent Claim 16	Shieh ’088
		Kempf at Figure 10  FIG. 10

No.	’111 Patent Claim 17	Shieh ’088
17[a]	The method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet, and	Shieh ’088 discloses the method according to claim 16, wherein the packet is a Transmission Control Protocol (TCP) packet. For example, Shieh ’088 discloses that the packet streams passing through its system include TCP packets. Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast

No.	'111 Patent Claim 17	Shieh '088
		group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table."). Shieh '088 ¶ [0036] ("During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.").
17[b]	wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof.	Shieh '088 discloses wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. For example, Shieh '088 discloses that some of the packets can be TCP FIN or TCP RST packets. Shieh '088 ¶ [0036] ("During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.").

No.	’111 Patent Claim 18	Shieh ’088
18[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Shieh ’088 discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* Claim 15[a].
18[b]	the header comprises at least the first and second entities addresses in the packet network, and	Shieh ’088 discloses the header comprises at least the first and second entities addresses in the packet network. For example, Shieh ’088 discloses unique parameters of a TCP/IP packet flow such as source and destination addresses in packet headers. Shieh ’088 ¶ [0031] (“According to one embodiment, referring back to FIG. 2A, when a security-processing function (e.g., processing node 211A) receives the packets, it does the security inspection and security policy enforcement. The packets then are forwarded to the next I/O function (e.g., modules 209A-209C). The choices of the next I/O function could be from the decision from layer 2 such as Ethernet MAC address lookup, or IP address routing, or other methods.”). Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”).

No.	'111 Patent Claim 18	Shieh '088
		Shieh '088 ¶ [0026] ("The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications."). Shieh '088 ¶ [0044] ("FIG. 6 is a block diagram illustrating architecture of a processing module according to one embodiment of the invention. Referring to FIG. 6, any of processing modules 300A and 300B can be implemented as part of any of the firewall modules (e.g., I/O module, security processing module, or service processing module) as shown in FIG. 3. In the example as shown in FIG. 6, multiple possible communication protocols can be utilized for the packet forwarding between firewall modules. If the firewall modules are on the same layer-2 networks, the packet can be forwarded through a layer-2 protocol, such as Ethernet protocol. In this example, it is assumed that each of firewall modules 300 a-300B has a dedicated virtual Ethernet interface (e.g., interfaces 301A and 301B) being used for the forwarding link and the packets are sent with Ethernet header of both sides' media access control (MAC) addresses. The packets can also be forwarded in a layer-3 protocol such as an IP protocol. During the layer-3 routing, original packets are encapsulated with another IP header, which carries the IP address of both sides. The encapsulation of the outer IP address would ensure the packets are sent, and received from the proper peer.").
18[c]	wherein the packet-applicable criterion is that the first entity address, the second entity address, or both	Shieh '088 discloses wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses.

No.	’111 Patent Claim 18	Shieh ’088
	match a predetermined address or addresses.	For example, Shieh ’088 discloses that IP or MAC addresses are packet-applicable criterion used to determine whether to forward packets to a security processing function based on whether the IP or MAC addresses match a predetermined address or addresses. Shieh ’088 ¶ [0031] (“According to one embodiment, referring back to FIG. 2A, when a security-processing function (e.g., processing node 211A) receives the packets, it does the security inspection and security policy enforcement. The packets then are forwarded to the next I/O function (e.g., modules 209A-209C). The choices of the next I/O function could be from the decision from layer 2 such as Ethernet MAC address lookup, or IP address routing, or other methods.”). Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”). Shieh ’088 ¶ [0026] (“The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the

No.	’111 Patent Claim 18	Shieh ’088
		controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”). Shieh ’088 ¶ [0044] (“FIG. 6 is a block diagram illustrating architecture of a processing module according to one embodiment of the invention. Referring to FIG. 6, any of processing modules 300A and 300B can be implemented as part of any of the firewall modules (e.g., I/O module, security processing module, or service processing module) as shown in FIG. 3. In the example as shown in FIG. 6, multiple possible communication protocols can be utilized for the packet forwarding between firewall modules. If the firewall modules are on the same layer-2 networks, the packet can be forwarded through a layer-2 protocol, such as Ethernet protocol. In this example, it is assumed that each of firewall modules 300 a-300B has a dedicated virtual Ethernet interface (e.g., interfaces 301A and 301B) being used for the forwarding link and the packets are sent with Ethernet header of both sides' media access control (MAC) addresses. The packets can also be forwarded in a layer-3 protocol such as an IP protocol. During the layer-3 routing, original packets are encapsulated with another IP header, which carries the IP address of both sides. The encapsulation of the outer IP address would ensure the packets are sent, and received from the proper peer.”).

No.	’111 Patent Claim 19	Shieh ’088
19	The method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses.	Shieh ’088 discloses the method according to claim 18, wherein the addresses are Internet Protocol (IP) addresses. For example, Shieh ’088 discloses that IP addresses are used to determine whether to forward packets to a security processing function based on whether the IP address matches a predetermined address or addresses. *See supra* Claim 18.

No.	’111 Patent Claim 19	Shieh ’088
		Shieh ’088 ¶ [0031] (“According to one embodiment, referring back to FIG. 2A, when a security-processing function (e.g., processing node 211A) receives the packets, it does the security inspection and security policy enforcement. The packets then are forwarded to the next I/O function (e.g., modules 209A-209C). The choices of the next I/O function could be from the decision from layer 2 such as Ethernet MAC address lookup, or IP address routing, or other methods.”). Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”). Shieh ’088 ¶ [0026] (“The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and

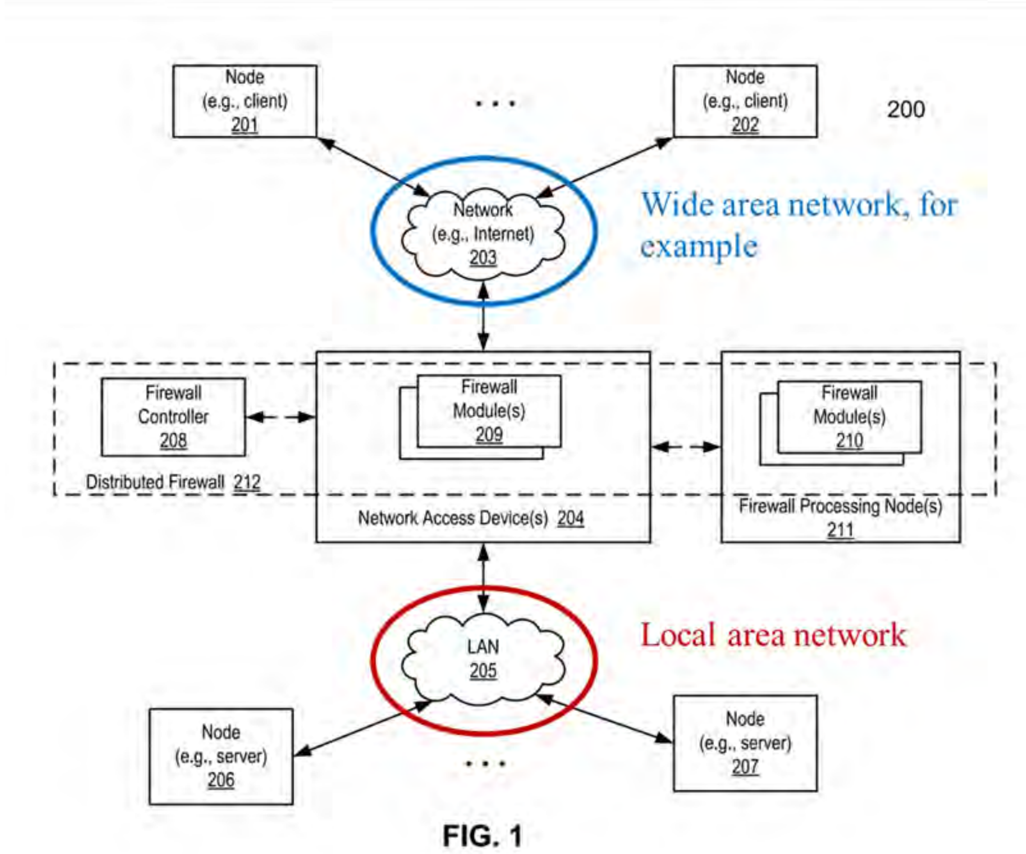
No.	’111 Patent Claim 19	Shieh ’088
		puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”). Shieh ’088 ¶ [0044] (“FIG. 6 is a block diagram illustrating architecture of a processing module according to one embodiment of the invention. Referring to FIG. 6, any of processing modules 300A and 300B can be implemented as part of any of the firewall modules (e.g., I/O module, security processing module, or service processing module) as shown in FIG. 3. In the example as shown in FIG. 6, multiple possible communication protocols can be utilized for the packet forwarding between firewall modules. If the firewall modules are on the same layer-2 networks, the packet can be forwarded through a layer-2 protocol, such as Ethernet protocol. In this example, it is assumed that each of firewall modules 300 a-300B has a dedicated virtual Ethernet interface (e.g., interfaces 301A and 301B) being used for the forwarding link and the packets are sent with Ethernet header of both sides' media access control (MAC) addresses. The packets can also be forwarded in a layer-3 protocol such as an IP protocol. During the layer-3 routing, original packets are encapsulated with another IP header, which carries the IP address of both sides. The encapsulation of the outer IP address would ensure the packets are sent, and received from the proper peer.”).

No.	’111 Patent Claim 20	Shieh ’088
20[a]	The method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields, and	Shieh ’088 discloses the method according to claim 1, wherein the packet is an Transmission Control Protocol (TCP) packet that comprises source and destination TCP ports, a TCP sequence number, and a TCP sequence mask fields. For example, Shieh ’088 discloses the transportation of TCP packets in a TCP network using TCP protocol, and describes tracking TCP packets that can be identified by their source and destination port. Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2)

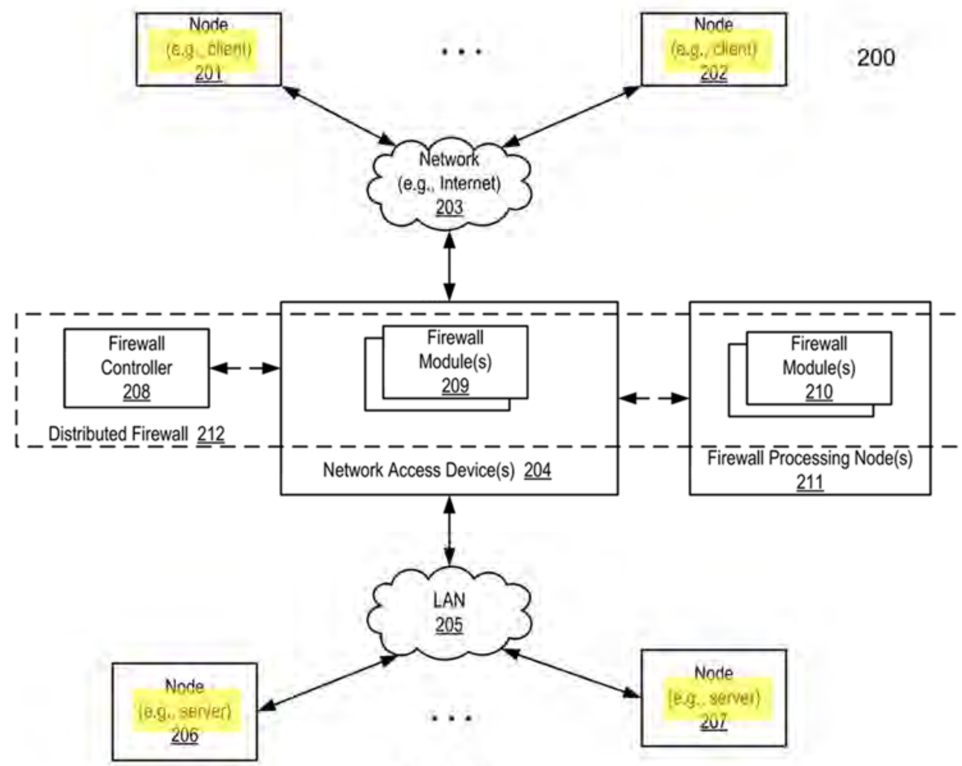
No.	’111 Patent Claim 20	Shieh ’088
		Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”). Shieh ’088 ¶ [0036] (“During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”).
20[b]	wherein the packet-applicable criterion is that the source TCP port, the destination TCP port, the TCP sequence number, the TCP sequence mask, or any combination thereof, matches a predetermined value or values.	Shieh ’088 discloses wherein the packet-applicable criterion is that the source TCP port or the destination TCP port. For example, Shieh ’088 discloses using a source TCP port or a destination TCP port are used to determine whether to take an action on the packet. Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not

No.	’111 Patent Claim 20	Shieh ’088
		always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”). Shieh ’088 ¶ [0036] (“During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”).

No.	’111 Patent Claim 21	Shieh ’088
21	The method according to claim 1, wherein the packet network comprises a Wide Area Network (WAN), Local Area Network (LAN), the Internet, Metropolitan Area Network (MAN), Internet Service Provider (ISP) backbone datacenter network, or inter - datacenter network.	Shieh ’088 discloses wherein the packet network comprises a Wide Area Network (WAN) or Local Area Network (LAN) or Internet Service Provider (ISP) backbone data center network. For example, Shieh ’088 discloses that its packet network includes the Internet, a WAN or LAN, and that its system can be in communication with an ISP. Shieh ’088 ¶ [0020] (“FIG. 1 is a block diagram illustrating an example of network configuration according to one embodiment of the invention. Referring to FIG. 1, network access device 204, which may be a router or gateway, a switch or an access point, etc., provides an interface between network 203 and network 205. Network 203 may be an external network such as a wide area network (WAN) (e.g., Internet) while network 205 represents a local area network (LAN). Nodes 206-207 go through gateway device 204 in order to reach nodes 201-202, or vice versa. Any of nodes 201-202 and 206-207 may be a client device (e.g., a desktop, laptop, Smartphone, gaming device) or a server.”).

No.	'111 Patent Claim 21	Shieh '088
		 Fig. 1 (annotation added) Shieh '088 ¶ [0053] ("Modem 447 may provide a direct connection to a remote server via a telephone link or to the Internet via an internet service provider (ISP). Network interface 448 may provide a direct connection to a remote server. Network interface 448 may provide a direct connection to a remote server via a direct network link to the Internet via a POP (point of presence). Network interface 448 may provide such connection using wireless techniques, including digital cellular telephone connection, a packet connection, digital satellite data connection or the like.").

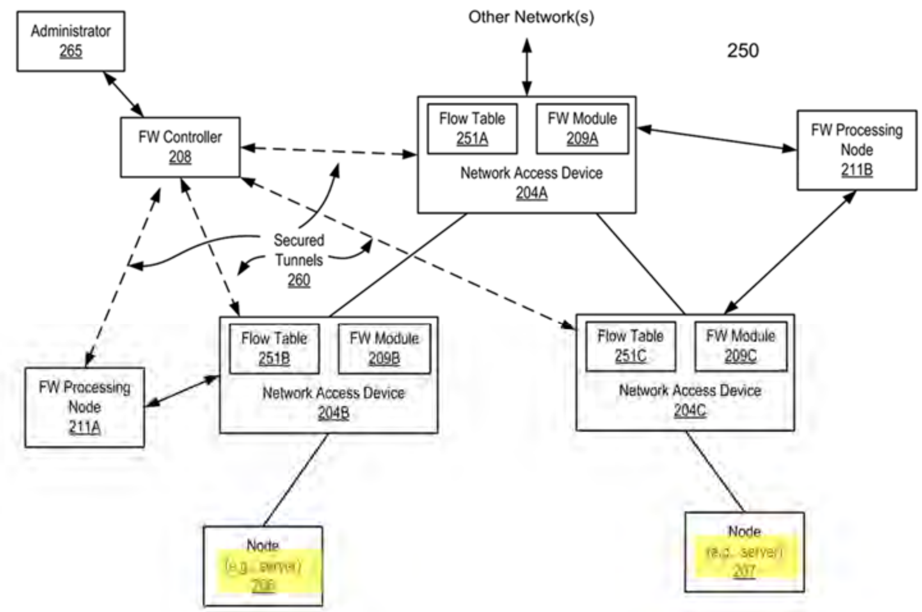
No.	’111 Patent Claim 22	Shieh ’088
22	The method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device.	Shieh ’088 discloses the method according to claim 1, wherein the first entity is a server device and the second entity is a client device, or wherein the first entity is a client device and the second entity is a server device. For example, Shieh ’088 discloses, in Figure 1, that the source of the network packets can be a server device, and the destination of the claimed packets can be a client device, or vice versa. Shieh ’088 ¶ [0020] (“FIG. 1 is a block diagram illustrating an example of network configuration according to one embodiment of the invention. Referring to FIG. 1, network access device 204, which may be a router or gateway, a switch or an access point, etc., provides an interface between network 203 and network 205. Network 203 may be an external network such as a wide area network (WAN) (e.g., Internet) while network 205 represents a local area network (LAN). Nodes 206-207 go through gateway device 204 in order to reach nodes 201-202, or vice versa. Any of nodes 201-202 and 206-207 may be a client device (e.g., a desktop, laptop, Smartphone, gaming device) or a server.”).

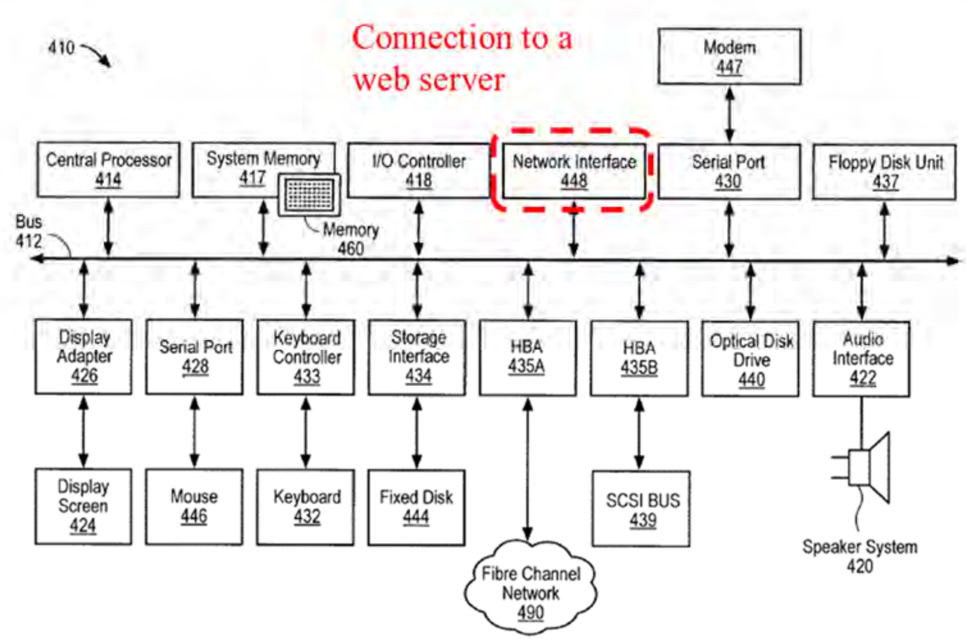
No.	'111 Patent Claim 22	Shieh '088
		 FIG. 1 Fig. 1 (annotation added) Shieh '088 ¶ [0022] ("A virtual machine represents a completely isolated operating environment with a dedicated set of resources associated therewith. A virtual machine may be installed or launched as a guest operating system (OS) hosted by a host OS. In one embodiment, a host OS represents a virtual machine monitor (VMM) (also referred to as a hypervisor) for managing the hosted virtual machines. A guest OS may be of the same or different types with respect to the host OS. For example, a guest OS may be a Windows™ operating system and a host OS may be a LINUX operating system. In addition, the guest operating systems (OSes) running on a host can be of the same or different types. A virtual

No.	'111 Patent Claim 22	Shieh '088
		machine can be any type of virtual machine, such as, for example, hardware emulation, full virtualization, para-virtualization, and operating system-level virtualization virtual machines. Different virtual machines hosted by a server may have the same or different privilege levels for accessing different resources."). Shieh '088 ¶ [0057] ("Referring to FIG. 8, the memory 460 includes a monitoring module 801 which when executed by a processor is responsible for performing traffic monitoring of traffic from the VMs as described above. Memory 460 also stores one or more IO modules 802 which, when executed by a processor, is responsible for performing forwarding inbound and outbound packets. Memory 460 further stores one or more security processing modules 803 which, when executed by a processor, is responsible for security processes on the packets provided by IO modules 802. Memory 460 also stores one or more optional service processing modules 804, which when executed by a processor performs a particular security process on behalf of security processing modules 803. The memory also includes a network communication module 805 used for performing network communication and communication with the other devices (e.g., servers, clients, etc.).").

No.	'111 Patent Claim 23	Shieh '088
23[a]	The method according to claim 22, wherein the server device comprises a web server, and	Shieh '088 discloses the method according to claim 22, wherein the server device comprises a web server. For example, Shieh '088 discloses that the source or destination of the packets can be a server device. Shieh '088 further discloses that the network interface my provide a direct connection to a remote server via a direct link to the Internet via POP. Shieh '088 ¶ [0039] ("An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a

No.	’111 Patent Claim 23	Shieh ’088
		packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the forwarding table. If it cannot find the connection in its local cache, the packets are forwarded to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets.”). Shieh ’088 ¶ [0053] (“Modem 447 may provide a direct connection to a remote server via a telephone link or to the Internet via an internet service provider (ISP). Network interface 448 may provide a direct connection to a remote server. Network interface 448 may provide a direct connection to a remote server via a direct network link to the Internet via a POP (point of presence). Network interface 448 may provide such connection using wireless techniques, including digital cellular telephone connection, a packet connection, digital satellite data connection or the like.”).

No.	’111 Patent Claim 23	Shieh ’088
		 FIG. 2A Fig. 2A (annotation added)

No.	'111 Patent Claim 23	Shieh '088
		 FIG. 4 Fig. 4 (annotation added) *See supra* Claim 22.
23[b]	wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device.	Shieh '088 discloses wherein the client device comprises a smartphone, a tablet computer, a personal computer, a laptop computer, or a wearable computing device. For example, Shieh '088 discloses that any of the nodes may be a client device such as a desktop, laptop, smartphone, gaming device, etc. Shieh '088 ¶ [0020] ("FIG. 1 is a block diagram illustrating an example of network configuration according to one embodiment of the invention. Referring to FIG. 1, network

No.	’111 Patent Claim 23	Shieh ’088
		access device 204, which may be a router or gateway, a switch or an access point, etc., provides an interface between network 203 and network 205. Network 203 may be an external network such as a wide area network (WAN) (e.g., Internet) while network 205 represents a local area network (LAN). Nodes 206-207 go through gateway device 204 in order to reach nodes 201-202, or vice versa. Any of nodes 201-202 and 206-207 may be a client device (e.g., a desktop, laptop, Smartphone, gaming device) or a server.”).

No.	’111 Patent Claim 24	Shieh ’088
24	The method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol.	Shieh ’088 discloses the method according to claim 22, wherein the communication between the network node and the controller is based on, or uses, a standard protocol. For example, Shieh ’088 discloses the use of the standard OpenFlow protocol for communication between the network access devices and the controller. Shieh ’088 ¶ [0025] (“According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols.”). Shieh ’088 ¶ [0026] (“The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be

No.	’111 Patent Claim 24	Shieh ’088
		to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”).

No.	’111 Patent Claim 27	Shieh ’088
27	The method according to claim 1, wherein the network node comprises a router, a switch, or a bridge.	Shieh ’088 discloses the method according to claim 1, wherein the network node comprises a router, a switch, or a bridge. For example, Shieh ’088 discloses network access devices may be a router or a gateway, a switch or an access point. *See supra* at Claim 1. Shieh ’088 ¶ [0020] (“FIG. 1 is a block diagram illustrating an example of network configuration according to one embodiment of the invention. Referring to FIG. 1, network access device 204, which may be a router or gateway, a switch or an access point, etc., provides an interface between network 203 and network 205. Network 203 may be an external network such as a wide area network (WAN) (e.g., Internet) while network 205 represents a local area network (LAN). Nodes 206-207 go through gateway device 204 in order to reach nodes 201-202, or vice versa. Any of nodes 201-202 and 206-207 may be a client device (e.g., a desktop, laptop, Smartphone, gaming device) or a server.”).

No.	’111 Patent Claim 28	Shieh ’088
28	The method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet.	Shieh ’088 discloses the method according to claim 1, wherein the packet network is an Internet Protocol (IP) network, and the packet is an IP packet. For example, Shieh ’088 discloses the use of IP addresses to identify packets being transmitted across the packet network. *See supra* at Claim 1.

No.	’111 Patent Claim 28	Shieh ’088
		Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”). Shieh ’088 ¶ [0031] (“According to one embodiment, referring back to FIG. 2A, when a security-processing function (e.g., processing node 211A) receives the packets, it does the security inspection and security policy enforcement. The packets then are forwarded to the next I/O function (e.g., modules 209A-209C). The choices of the next I/O function could be from the decision from layer 2 such as Ethernet MAC address lookup, or IP address routing, or other methods.”). Shieh ’088 ¶ [0038] (” FIG. 3 is a block diagram illustrating an example of a distributed firewall according to one embodiment of the invention. Referring to FIG. 3, distributed firewall 212 includes, for the purpose of illustration, four different types of modules: virtual I/O modules 301-304, security processing modules 309-311, service processing modules 312-313, and central controller 208. All these modules can run on the same virtual machine, or on different virtual machines, or on same or different physical hosts. In one embodiment, the communication protocol between the modules is IPC (inter-process communication) if they run on the same memory space, use layer-2 network protocol if they are on the same layer-2 network, or use IP protocols if they are connected through IP

No.	’111 Patent Claim 28	Shieh ’088
		networks. Some or all of modules 301-304 and 309-313 may be executed within a virtual machine. Dependent upon the specific configuration, each of modules 301-304 and 309-313 may be executed by a respective virtual machine. In other configurations, multiple of modules 301-304 and 309-313 may be executed by the same virtual machine.”).

No.	’111 Patent Claim 29	Shieh ’088
29	The method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet.	Shieh ’088 discloses the method according to claim 28, wherein the packet network is an Transmission Control Protocol (TCP) network, and the packet is an TCP packet. For example, Shieh ’088 discloses that the packet streams passing through its system include TCP packets. Shieh ’088 further discloses the transportation of TCP packets across a TCP network using TCP protocol. *See supra* Claim 28. Shieh ’088 ¶ [0027] (“Referring back to FIG. 2A, in one embodiment, each of the network access devices 204A-204C maintains a flow table or session table (e.g., flow tables 251A-251C) and a firewall module (e.g., 209A-209C). A network flow refers to a sequence of packets from a source computer to a destination, which may be another host, a multicast group, or a broadcast domain. For example, a TCP/IP flow can be uniquely identified by the following parameters within a certain time period: 1) Source and Destination IP address; 2) Source and Destination Port; and 3) Layer 4 Protocol (TCP/UDP/ICMP). A session is a semi-permanent interactive information interchange, also known as a dialogue, a conversation or a meeting, between two or more communicating devices. A session is set up or established at a certain point in time and torn down at a later point in time. An established communication session may involve more than one message in each direction. A session is typically, but not always, stateful, meaning that at least one of the communicating entities needs to save information about the session history in order to be able to communicate, as opposed to stateless communication, where the communication consists of independent requests with responses. Flow tables 251A-251C may be implemented as a combination of a flow table and a session table.”).

No.	’111 Patent Claim 29	Shieh ’088
		Shieh ’088 ¶ [0036] (“During the bypass phase, the I/O function may notify the security-processing function if there are special events in the packet stream. These events could be receipt of TCP FIN or TCP RST packets, or not receiving any packets of the connection within a time threshold. The notification from I/O functions to security processing functions could help to clean up the state in the security-processing nodes.”).

No.	’111 Patent Claim 30	Shieh ’088
30[a]	The method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets;	Shieh ’088 discloses the method according to claim 1, further comprising: receiving, by the network node from the first entity over the packet network, one or more additional packets. For example, Shieh ’088 discloses that its method can be applied to subsequent packets of a particular packet flow or session. *See also* Claim 1. Shieh ’088 ¶ [0018] (“According to one embodiment, an administrator can configure, for example, via a controller or a management entity, a network access device to set up a set of filtering rules specifying whether and/or what types of packets should be forwarded to a security device and which of the security devices for security inspection. In this embodiment, the controller is configured to manage multiple network access devices and/or multiple security devices. Alternatively, a security device may inform a network access device that subsequent packets of a particular session should be forwarded from the network access device for security inspection. In one embodiment, a security device performs the security inspection at the beginning of the flow or session, and at a certain point, the security device decides that it no longer needs to inspect further packets of the same session.). Shieh ’088 ¶ [0037] (“FIG. 2B is a processing flow diagram illustrating a process of security inspection according to one embodiment of the invention. Referring to FIG. 2B, as an example, network switch 272 may represent any of network access devices 204A-204C and security device 273 may represents any of security processing devices 211A-211B as described above with respect to FIG. 2A. When device 272 receives a packet from a source node 271 via transaction 281, device 272 may determine whether the packet should be forwarded to security device 273. For example, device 272 may look up in its session table

No.	'111 Patent Claim 30	Shieh '088
		such as the one as shown in FIG. 5 to determine whether a bypass flag has been set to a predetermined value. If the bypass flag matches the predetermined value, the packet is forwarded to security device 273 via path 282; otherwise, the packet is routed to destination node 274. Alternatively, if there is no entry in the session table corresponding to the current session, the packet will also be transmitted to security device 273. After network device 272 receives a response from security device 273 via path 283, dependent upon the response, the packet may then be routed to destination node 274 via path 284. These processes may continue until a notification is received from security device 273 via path 285 indicating that it no longer wishes to receive further packets of the same session for inspection, such that subsequent packets will be directly routed to destination node 274 via path 286 without routing to security device 273. If there are certain events that have been registered from security device 273, network device 272 may notify security device 274 via path 287 upon detecting the registered events.").
30[b]	checking, by the network node, if any one of the one or more additional packets satisfies the criterion;	Shieh '088 discloses checking, by the network node, if any one of the one or more additional packets satisfies the criterion. For example, Shieh '088 discloses classifying each incoming packet, not limited to a single packet, to see if it satisfies the criterion in the forwarding table *i.e.*, checking, by the network node, if any one of the one or more additional packets satisfies the criterion. *See also* Claim 1[d]. Shieh '088 ¶ [0039] "(An I/O module running within a virtual machine is referred to herein as a virtual I/O module. Each of virtual I/O modules 301-304 receives packets from any of servers 321-324 of LAN 320 and sends packets to external network 315 outside of the firewall. In one embodiment, each of I/O modules 301-304 keeps a local cache (e.g., caches 305-308) storing location(s) of a security processing module(s) (e.g., security processing modules 309-311) for each connection session. A cache maintained by each I/O module contains a forwarding table mapping certain connection sessions to any of security modules 309-311. An example of a forwarding table is shown in FIG. 5. Upon receiving a packet, an I/O module performs a packet classification to find out the associated connection and forwards the packet to the corresponding security processing module identified by the forwarding table. If it cannot find the connection in its local cache, the packets are forwarded

No.	’111 Patent Claim 30	Shieh ’088
		to central controller 208 for processing. In such a case, controller 208 assigns the connection to one of security processing modules 309-311 based on one or more of a variety of factors such as load balancing. The virtual I/O modules 302-304 can be located at multiple locations of the networks to receive and send out packets.”).
30[c]	responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity; and	Shieh ’088 discloses responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity. Shieh ’088 discloses transmitting each packet to the destination node without forwarding the packet to the security device, if the data member does not match the predetermined value, where the data member is inspected respective to each packet received, *i.e.*, responsive to an additional packet not satisfying the criterion, sending, by the network node over the packet network, the additional packet to the second entity. *See supra* Claim 30[b]. *See also* Claim 1[e].
30[d]	responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction.	Shieh ’088 discloses responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction. For example, Shieh ’088 discloses an embodiment in which a “virtual I/O module” functions as a network nodes that receives packets from servers and sends packets to an external network, depending on existing connections in a local cache, *i.e.*, responsive to the additional packet satisfying the criterion, sending the additional packet, by the network node over the packet network, in response to the instruction. *See supra* Claim 30[b]. *See also* Claim 1[f].

No.	’111 Patent Claim 31	Shieh ’088
31[a]	The method according to claim 1, wherein the packet network is a Software Defined Network (SDN),	Shieh ’088 discloses the method according to claim 1, wherein the packet network is a Software Defined Network (SDN). For example, Shieh ’088 discloses that it uses an OpenFlow protocol (an SDN networking standard) in which a packet is routed as part of the data plane. Shieh ’088 ¶ [0025] (“According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols.”).
31[b]	the packet is routed as part of a data plane and	Shieh ’088 discloses that the packet is routed as part of a data plane. For example, Shieh ’088 discloses that it uses an Openflow protocol (an SDN networking standard) in which a packet is routed as part of the data plane. Shieh ’088 ¶ [0025] (“According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches

No.	’111 Patent Claim 31	Shieh ’088
		to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols.”).
31[c]	the network node communication with the controller serves as a control plane.	Shieh ’088 discloses that the network node communication with the controller serves as a control plane. For example, Shieh ’088 discloses that the controller communicates with the switches via the Openflow protocol. Shieh ’088 ¶ [0025] (“According to one embodiment, each of network access devices 204A-204C maintains a persistent connection such as secure connections or tunnels 260 with a controller or management entity 208 for exchanging management messages and configurations, or distributing routing information to network access devices 204A-204C, etc. In one embodiment, controller 208 communicates with each of the network access devices 204A-204C using a management protocol such as the OpenFlow™ protocol. OpenFlow is a Layer 2 communications protocol (e.g., media access control or MAC layer) that gives access to the forwarding plane of a network switch or router over the network. In simpler terms, OpenFlow allows the path of network packets through the network of switches to be determined by software running on multiple routers (minimum two of them, primary and secondary, having a role of observers). This separation of the control from the forwarding allows for more sophisticated traffic management than is feasible using access control lists (ACLs) and routing protocols.”). Shieh ’088 ¶ [0026] (“The OpenFlow technology consists of three parts: flow tables installed on switches, a controller, and an OpenFlow protocol for the controller to talk securely with switches. Flow tables are set up on switches or routers. Controllers talk to the switches via the OpenFlow Protocol, which is secure, and impose policies on flows. For example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be

No.	’111 Patent Claim 31	Shieh ’088
		to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics. Using OpenFlow takes control of how traffic flows through the network out of the hands of the infrastructure, the switches and routers, and puts it in the hands of the network owner (such as a corporation), individual users or individual applications.”).

EXHIBIT D-6
Defendant's Preliminary Invalidity Contentions
Orckit Corporation v. Cisco Systems, Inc., 2:22-cv-00276-JRG-RSP

Chart for U.S. Patent 10,652,111 ("the '111 Patent")
Cisco Intelligent WAN ("Cisco IWAN System")

As shown in the chart below, all Asserted Claims of the '111 Patent are invalid under (1) AIA-35 U.S.C. § 102 (a) because Cisco IWAN System meets each element of those claims, (2) invalid under AIA-35 U.S.C. § 102 (a) because the references describing the Cisco IWAN System disclose every limitation of every Asserted Claim, and/or (3) 35 U.S.C. § 103 because Cisco IWAN System renders those claims obvious either alone, or in combination with the knowledge of a person having ordinary skill in the art, and in further combination with the references specifically identified below and in the following claim chart and/or one or more references identified in Defendant's Preliminary Invalidity Contentions. The Cisco IWAN System comprises various Cisco switches and routers from before April 22, 2014 that implemented Cisco's IWAN feature. The following quotations and diagrams come from documentation describing Cisco IWAN System and its functionalities that were published prior to April 22, 2014.

- https://www.cisco.com/c/dam/global/hr_hr/assets/ciscoconnect/2014/pdfs/cc_see_2014_iwan_next_generation_branch.pdf ("IWAN Next Gen")
- Cisco Performance Routing (PfR) Solution Guides ("PfR Solution Guides")
- Cisco Intelligent WAN (IWAN): Right-Size Your Network without Compromise ("IWAN Right Size")
- Cisco presentation titled "Cisco Next Generation Branch Architecture", dated November 2013 ("Cisco Next Generation")
- Cisco presentation titled "Cisco Intelligent WAN (IWAN)", dated November 2013 ("Cisco IWAN")
- Cisco presentation titled "Cisco Intelligent WAN (IWAN) – Uncompromised Experience over Any Link", dated November 2013 ("Cisco IWAN – Uncompromised Experience")
- Cisco document titled, "Cisco Network Architecture Discovery, Planning, Design and Implementation Services for Intelligent WAN" ("IWAN At-A-Glance")
- https://www.youtube.com/watch?v=GQuRzr__N-c ("DMVPN QoS for Intelligent WAN")
- https://www.youtube.com/watch?v=XFsqTENxopo ("2014 March Webinar LiveAction IWAN Management")
- https://www.youtube.com/watch?v=8mWSXKIz2hk ("IWAN Management Technical Presentation and Demo")
- https://web.archive.org/web/20140226054405/http://www.cisco.com/c/en/us/solutions/enterprise-networks/intelligent-wan/index.html ("Cisco Intelligent WAN")

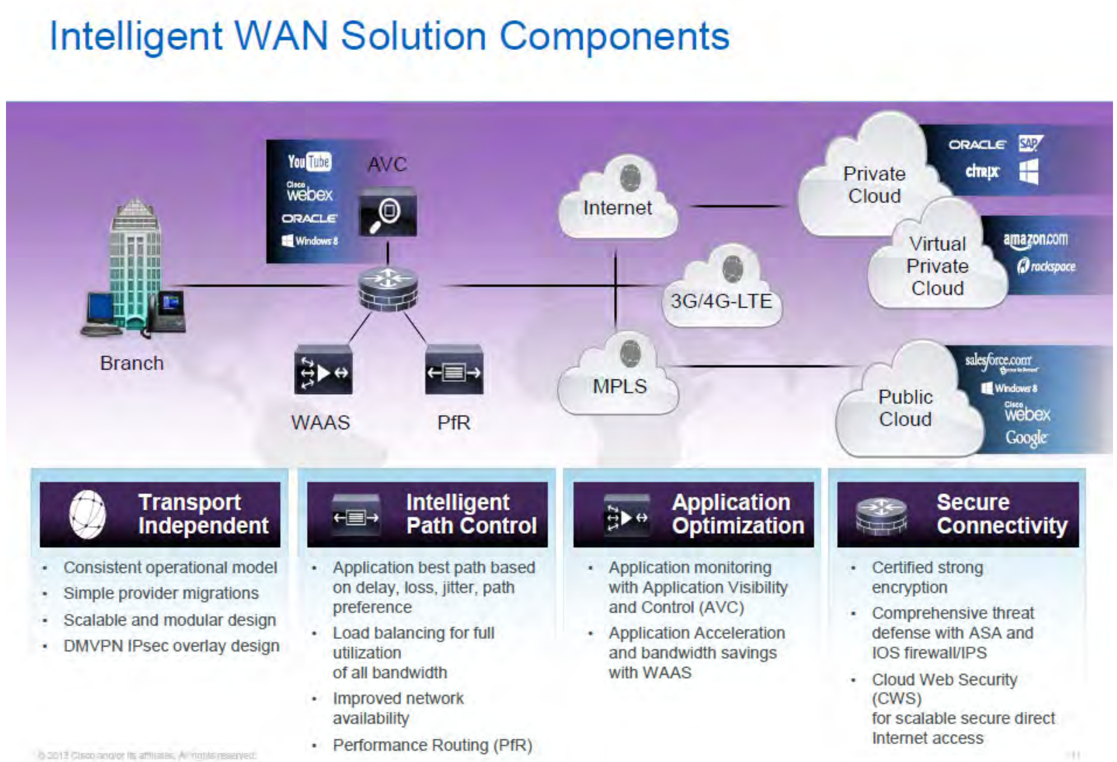
- https://web.archive.org/web/20140813171810/http://www.cisco.com/c/dam/en/us/solutions/collateral/enterprise-networks/intelligent-wan/white-paper-c11-729752.pdf (“Cisco IWAN and Akamai Intelligent Platform™: Maximize Your
- WAN Investment”)
- https://web.archive.org/web/20140225095408/http://www.cisco.com/c/dam/en/us/solutions/collateral/borderless-networks/application-experience/connect_to_the_cloud.pdf (“Cisco Application Services Platform”)

Motivations to combine the disclosures in Cisco IWAN System with disclosures in other publications known in the art, as explained in this chart, include at least the similarity in subject matter between the references to the extent they concern methods relating to routing certain network traffic to entities for further analysis and inspection. Insofar as the references cite other patents or publications, or suggest additional changes, one of ordinary skill in the art would look beyond a single reference to other references in the field.

These invalidity contentions are based on Defendant’s present understanding of the Asserted Claims, and Orckit’s apparent construction of the claims in its November 3, 2022 Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1, and Orckit’s January 19, 2023 First Amended Disclosure of Asserted Claims and Infringement Contentions Pursuant to P.R. 3-1 (Orckit’s “Infringement Disclosures”), which is deficient at least insofar as it fails to cite any documents or identify accused structures, acts, or materials in the Accused Products with particularity. Defendant does not agree with Orckit’s application of the claims, or that the claims satisfy the requirements of 35 U.S.C. § 112. Defendant’s contentions herein are not, and should in no way be seen as, admissions or adoptions as to any particular claim scope or construction, or as any admission that any particular element is met by any accused product in any particular way. Defendant objects to any attempt to imply claim construction from this chart. Defendant’s prior art invalidity contentions are made in a variety of alternatives and do not represent Defendant’s agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein.

The following contentions are subject to revision and amendment pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules, and the Orders of record in this matter subject to further investigation and discovery regarding the prior art and the Court’s construction of the claims at issue.

No.	’111 Patent Claim 1	Cisco IWAN System
1[preamble]	A method for use with a packet network including a network node for transporting packets between first and second entities	Cisco IWAN System discloses a method for use with a packet network including a network node for transporting packets between first and second entities under control of a controller that is external to the network node, the method comprising. For example, Cisco IWAN System discloses a communication method utilizing branch devices/border routers that transport data packets between user devices and/or data center

No.	'111 Patent Claim 1	Cisco IWAN System
	under control of a controller that is external to the network node, the method comprising:	devices. Cisco IWAN System further discloses communication within a network using border routers under the control of an external hub/master controller. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. IWAN Next Gen at 11  IWAN Next Gen at 16

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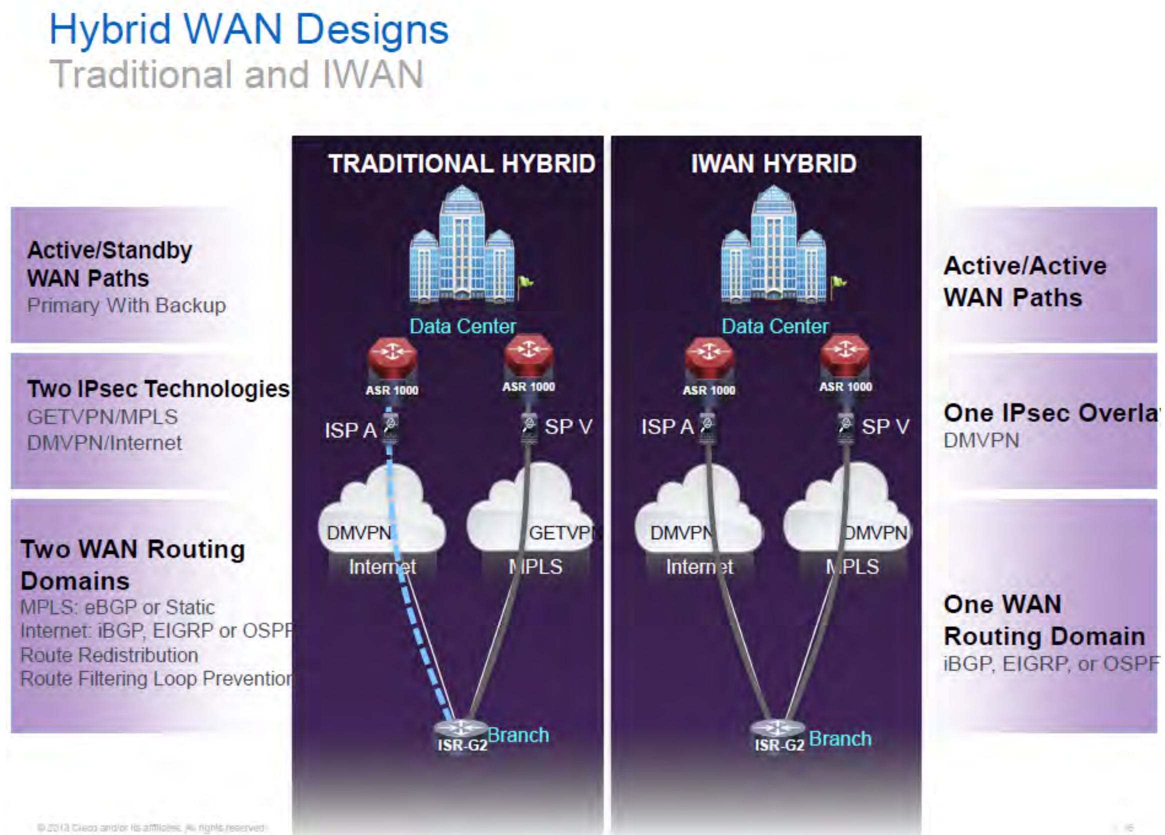
<tr><td></td><td></td><td>

IWAN Next Gen at 17</td></tr>
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		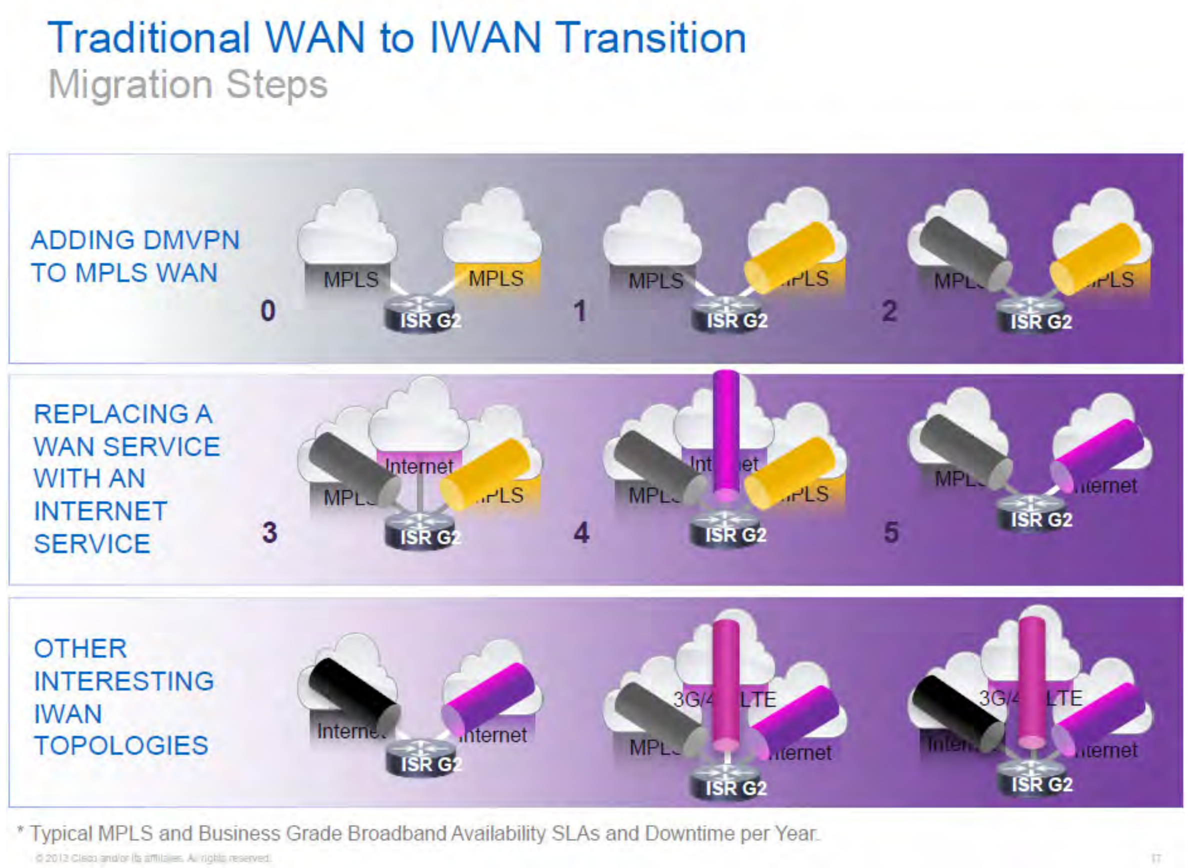 IWAN Next Gen at 18

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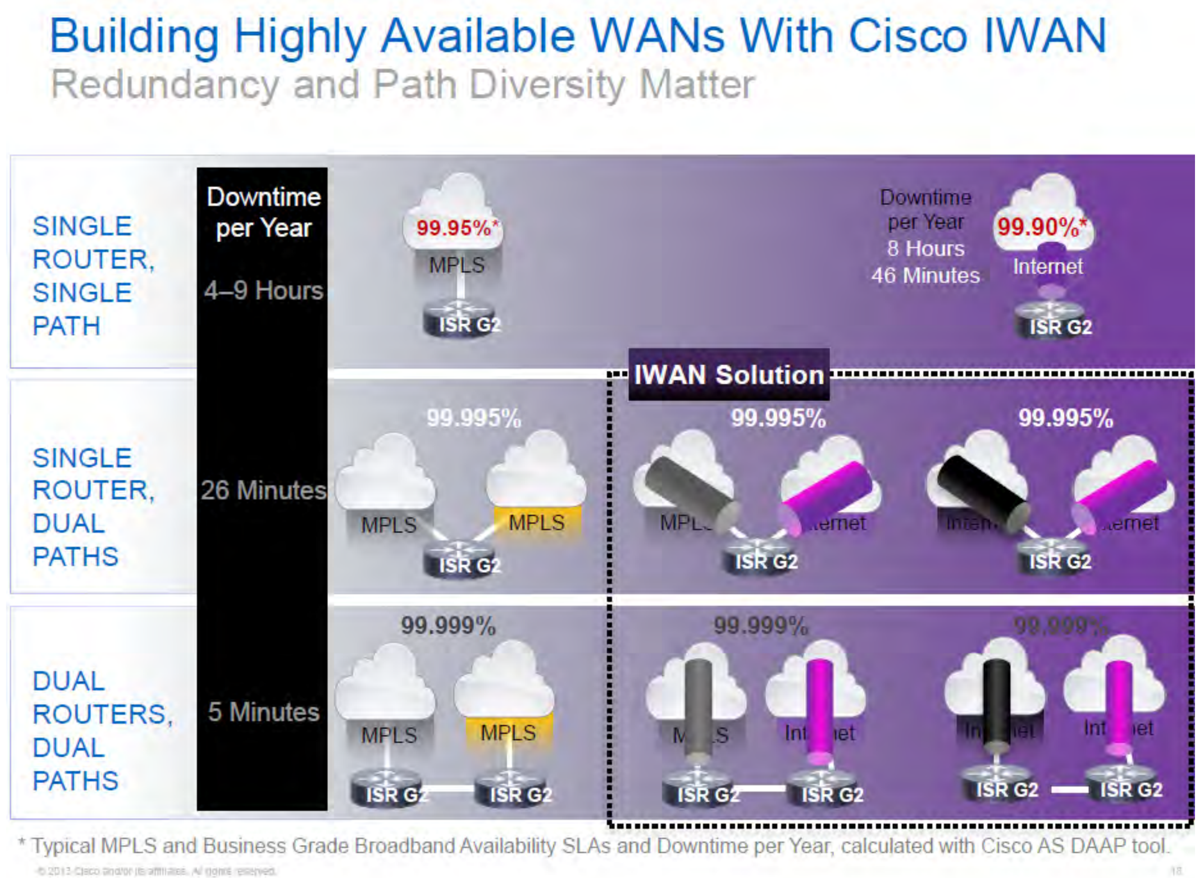
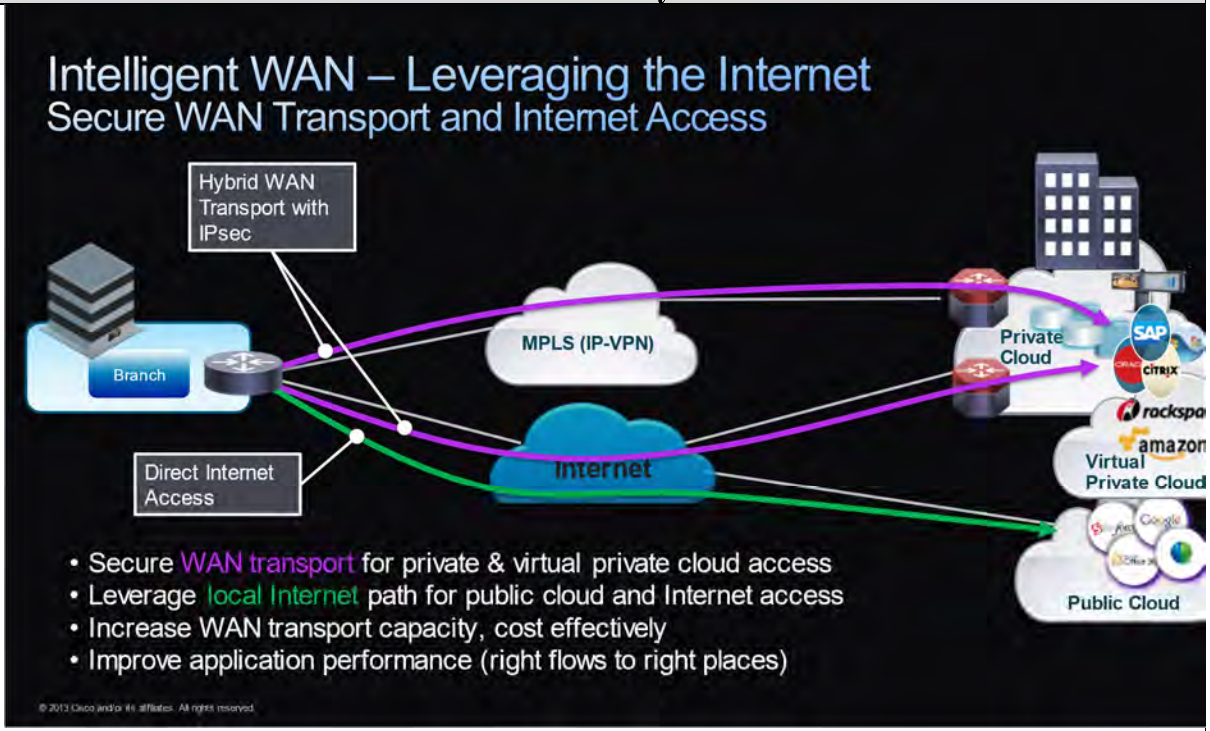
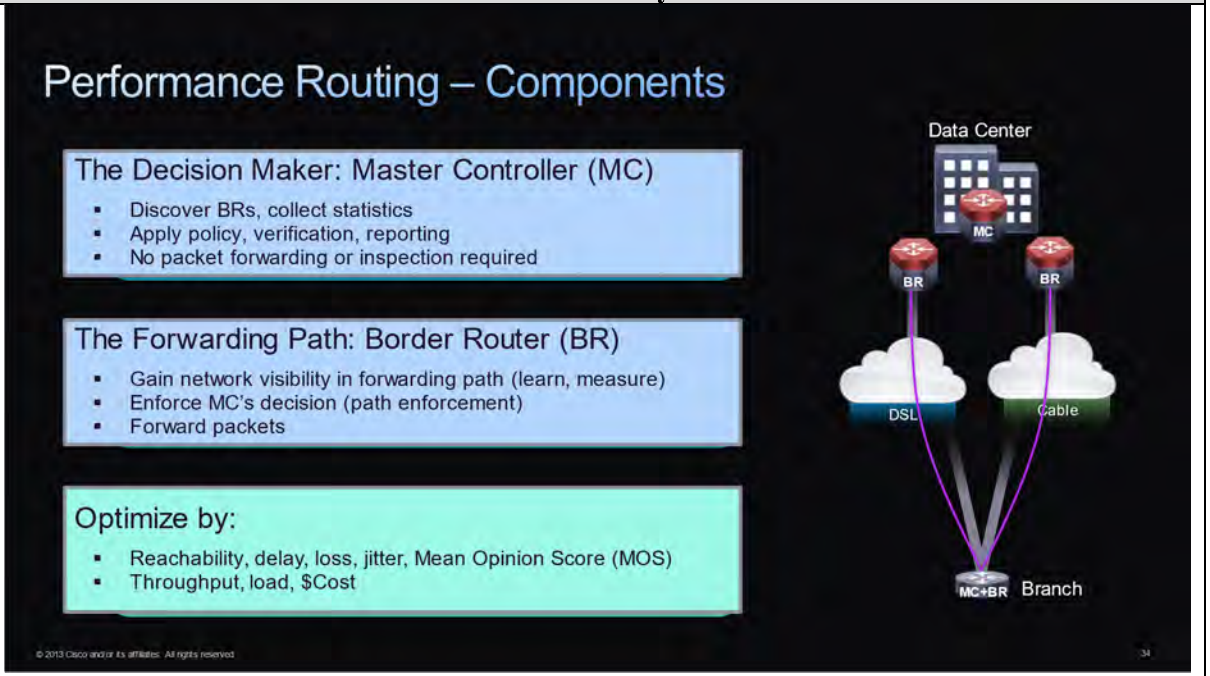
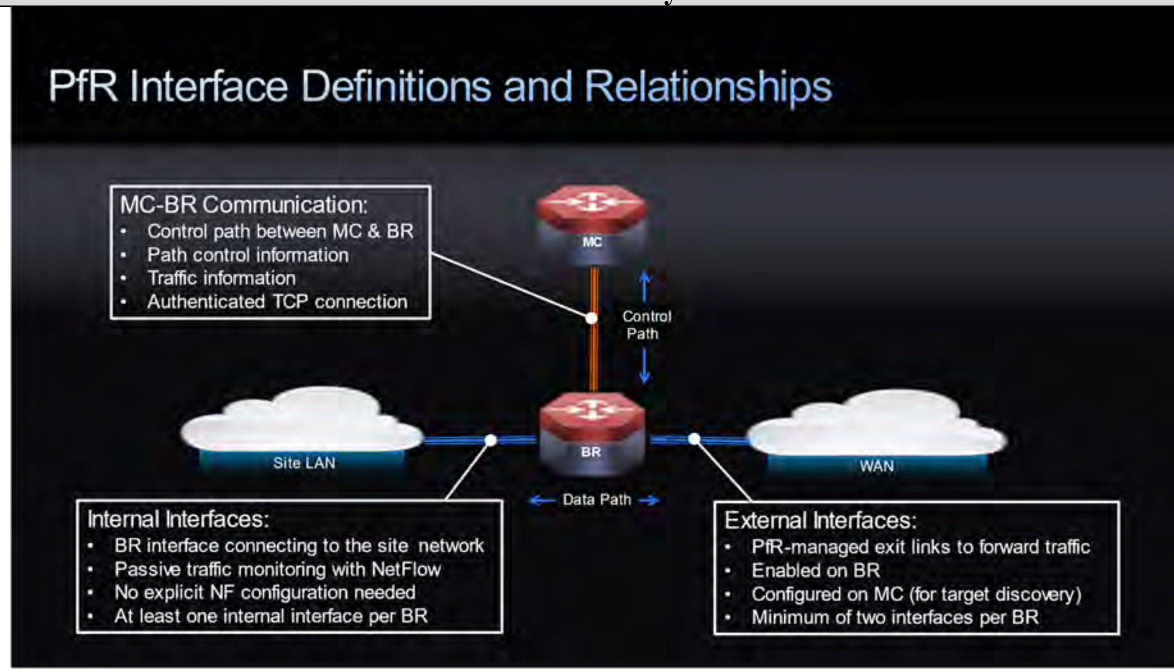
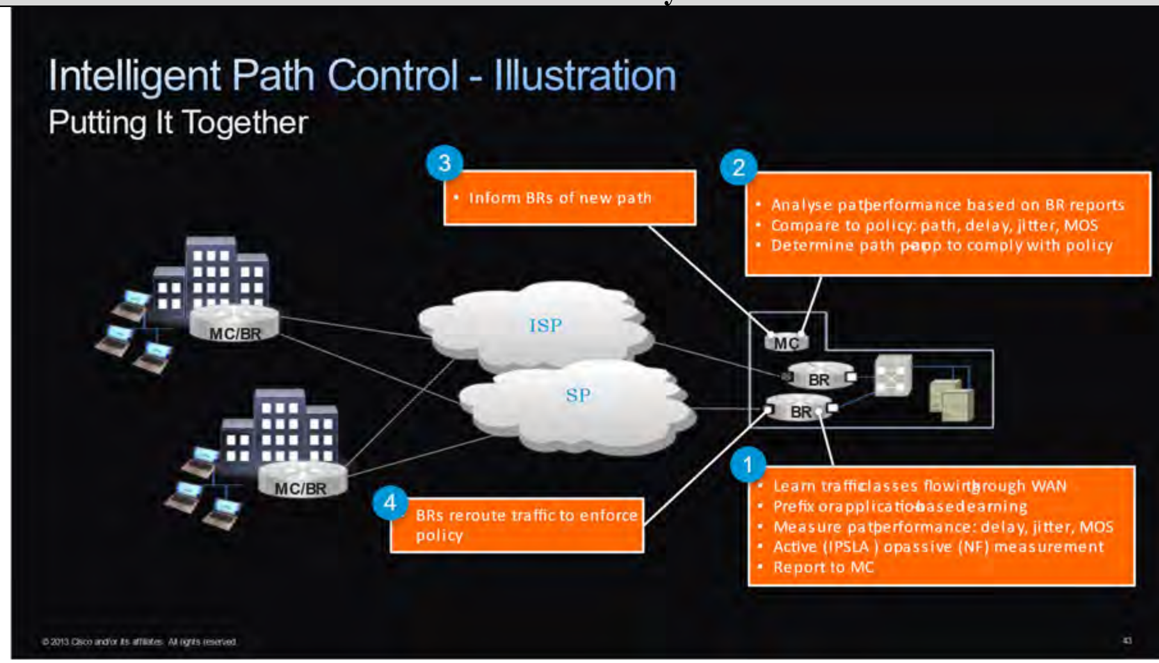
		 Cisco Next Generation

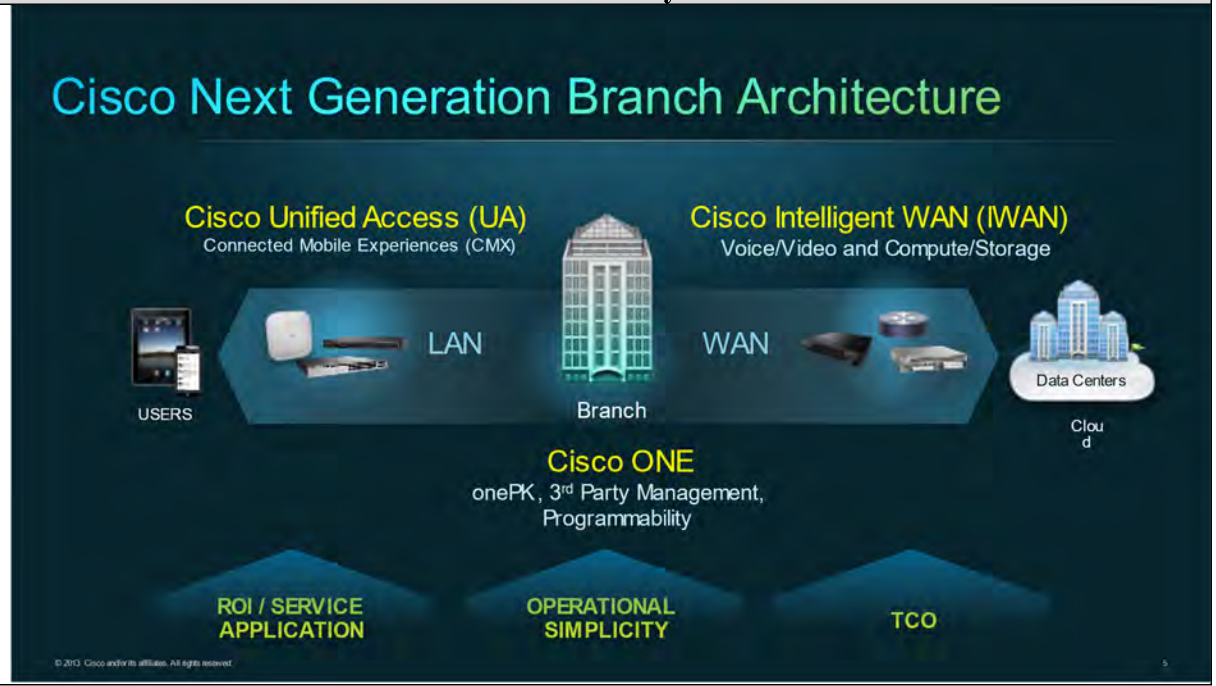
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

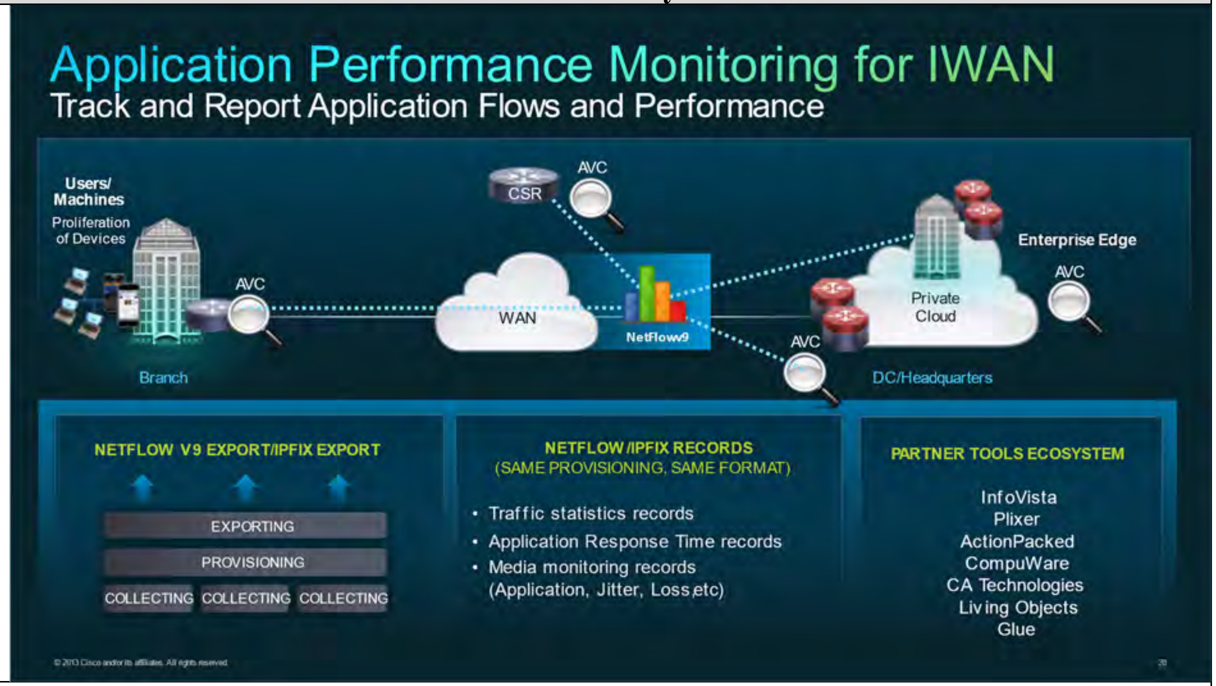
No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

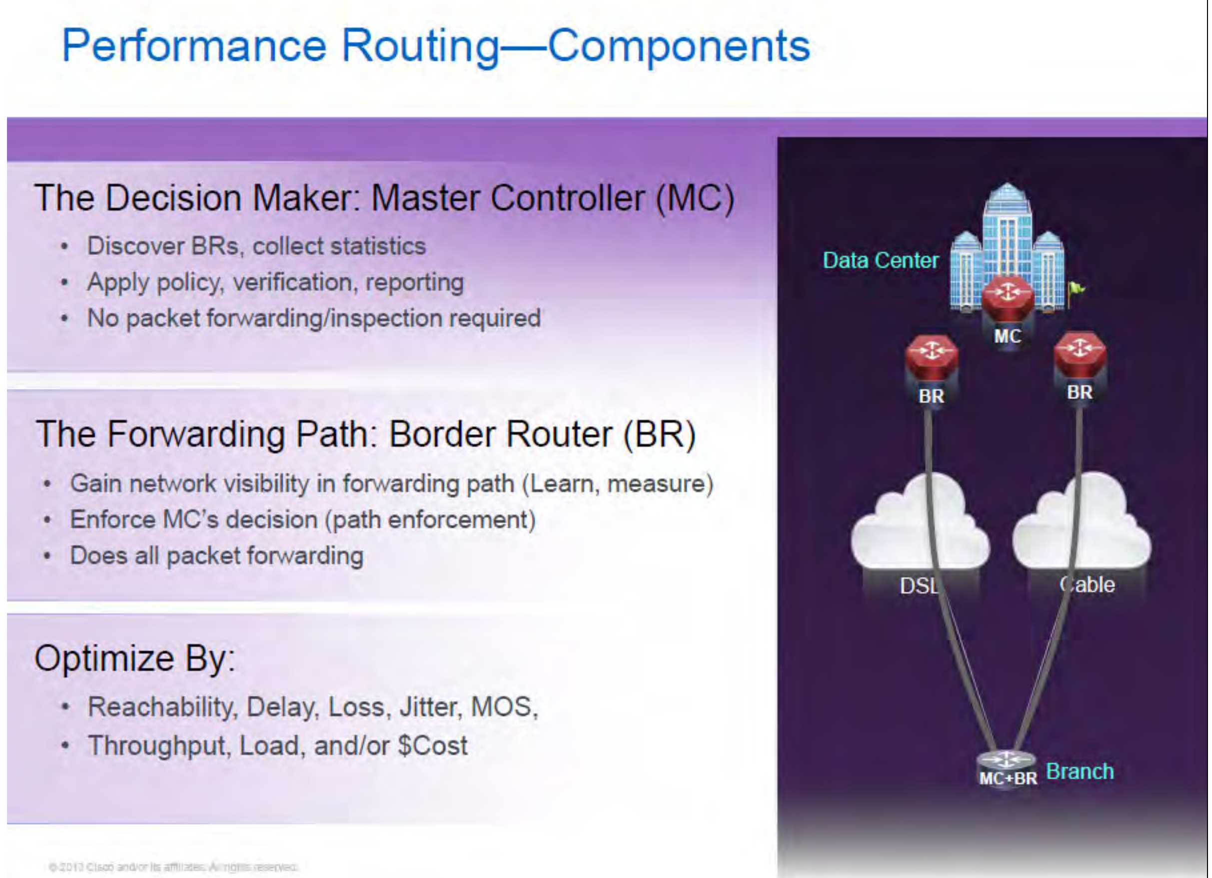
No.	’111 Patent Claim 1	Cisco IWAN System
		

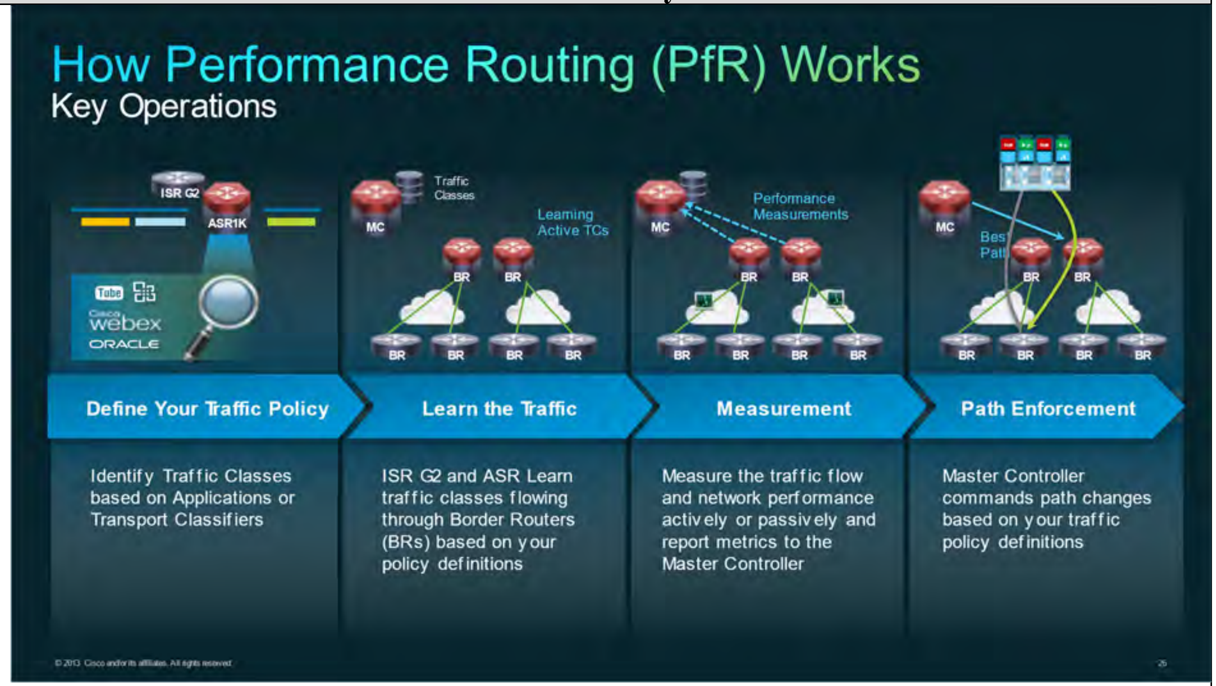
No.	'111 Patent Claim 1	Cisco IWAN System
		

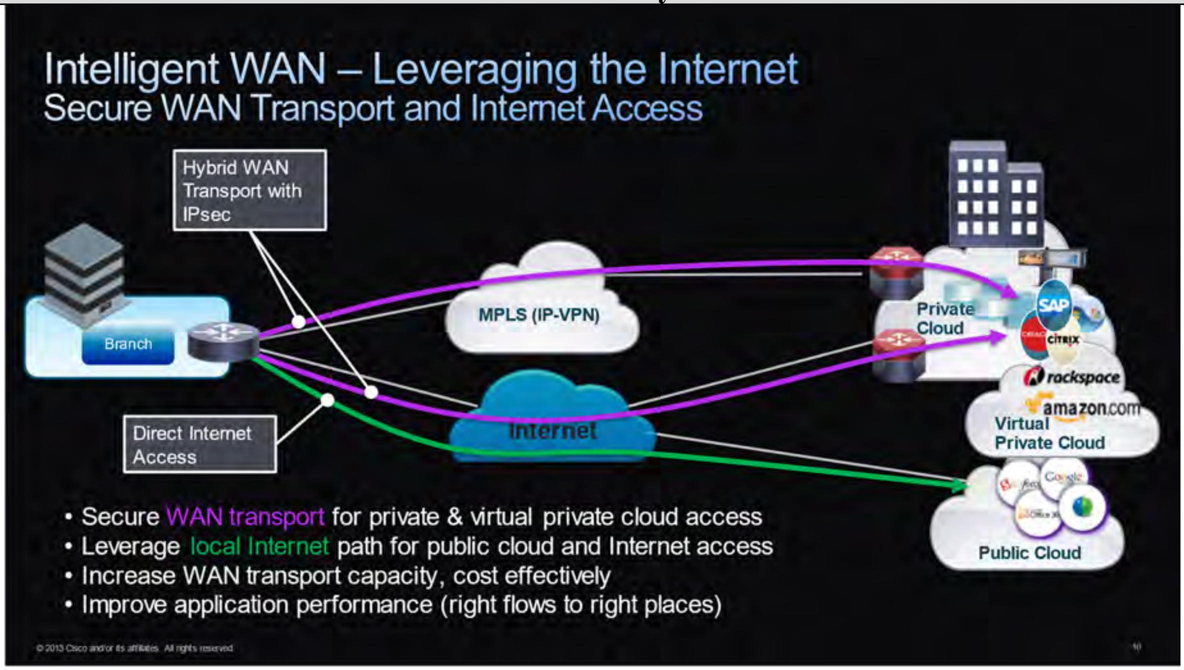
No.	’111 Patent Claim 1	Cisco IWAN System
		 IWAN At-A-Glance

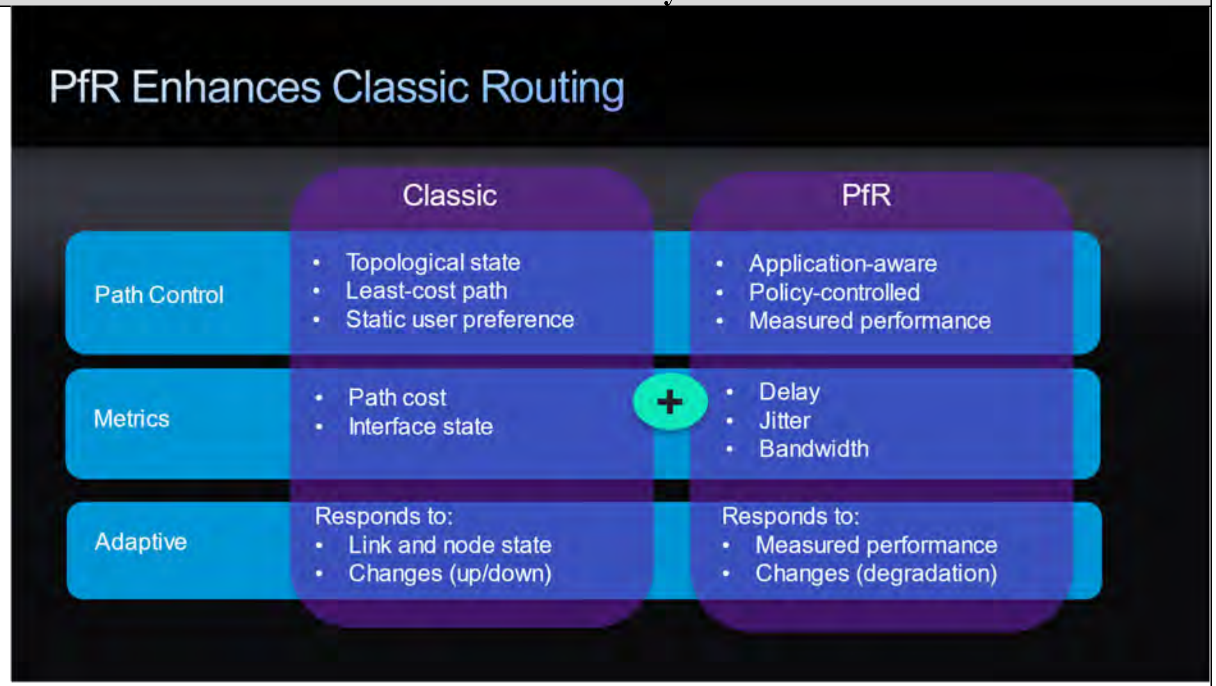
No.	'111 Patent Claim 1	Cisco IWAN System
		

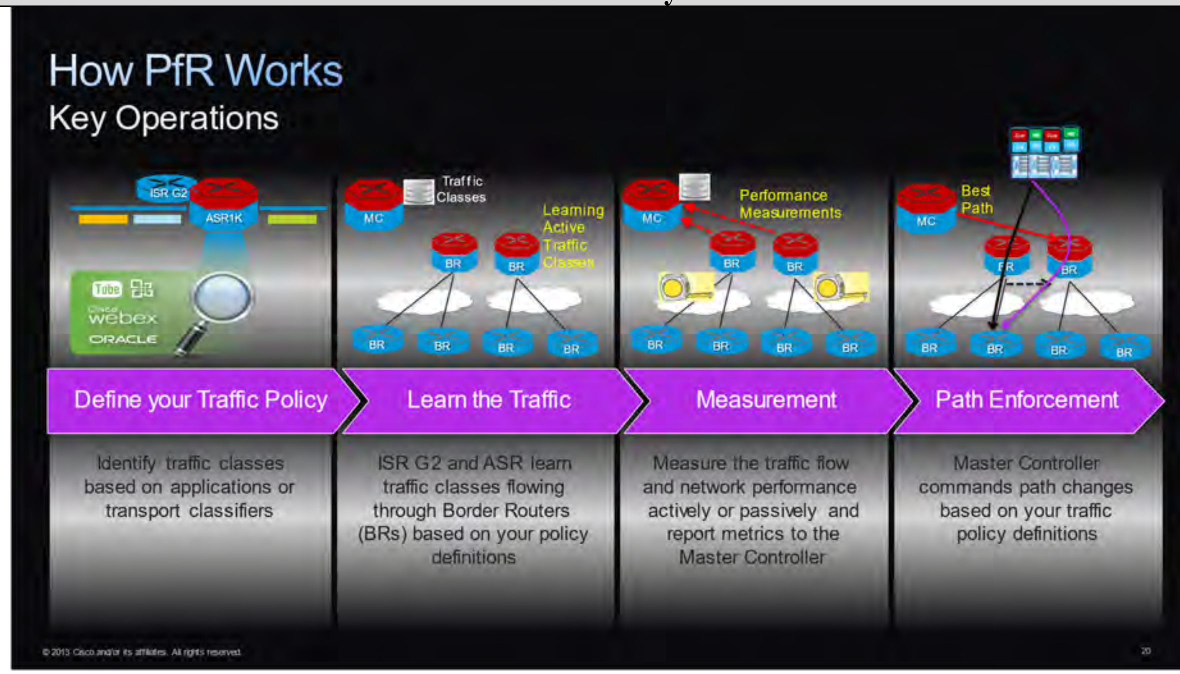
No.	'111 Patent Claim 1	Cisco IWAN System
		
1[a]	sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion;	Cisco IWAN System discloses sending, by the controller to the network node over the packet network, an instruction and a packet-applicable criterion. For example, Cisco IWAN System discloses sending by the hub/master controller (MC) to the branch devices/border routers. IWAN Next Gen at 25

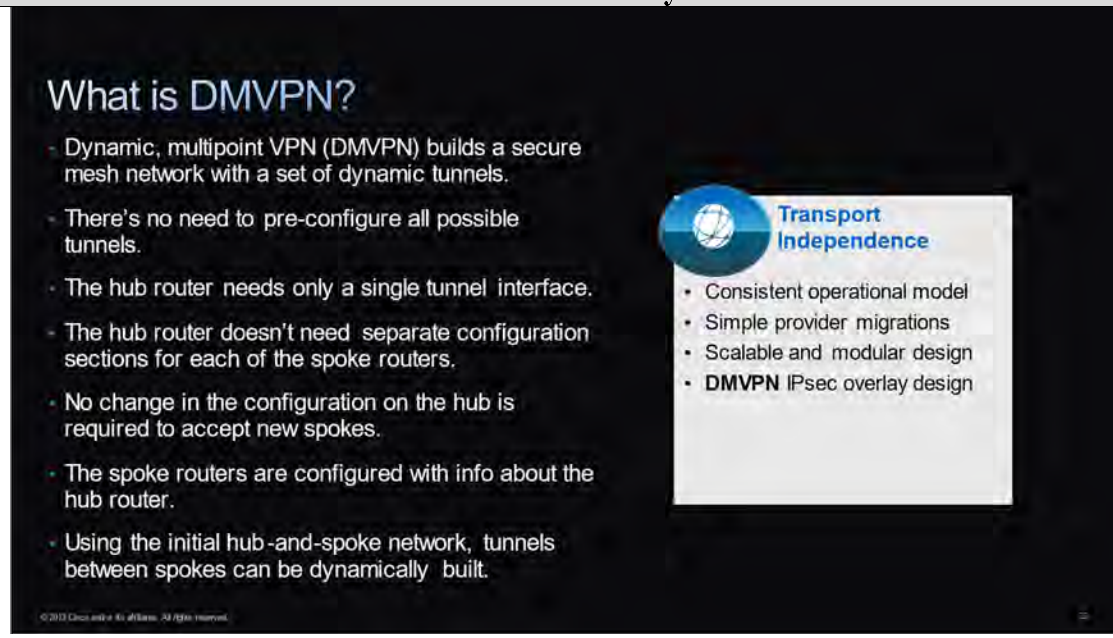
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco Next Generation

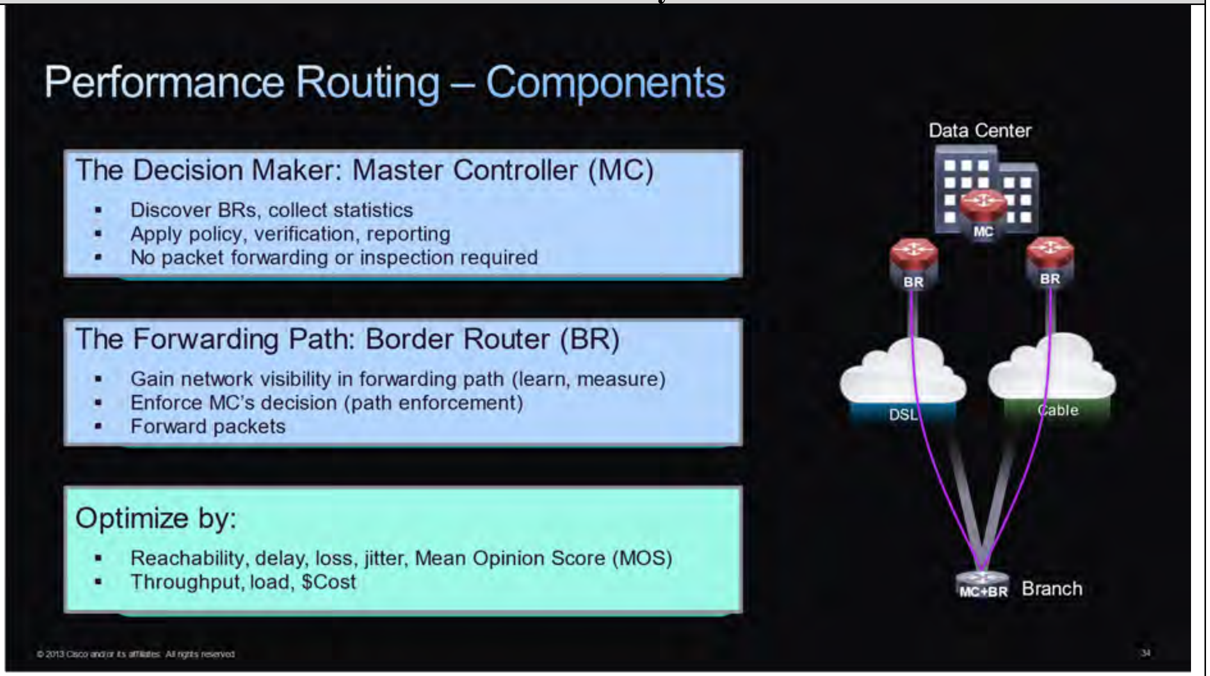
No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

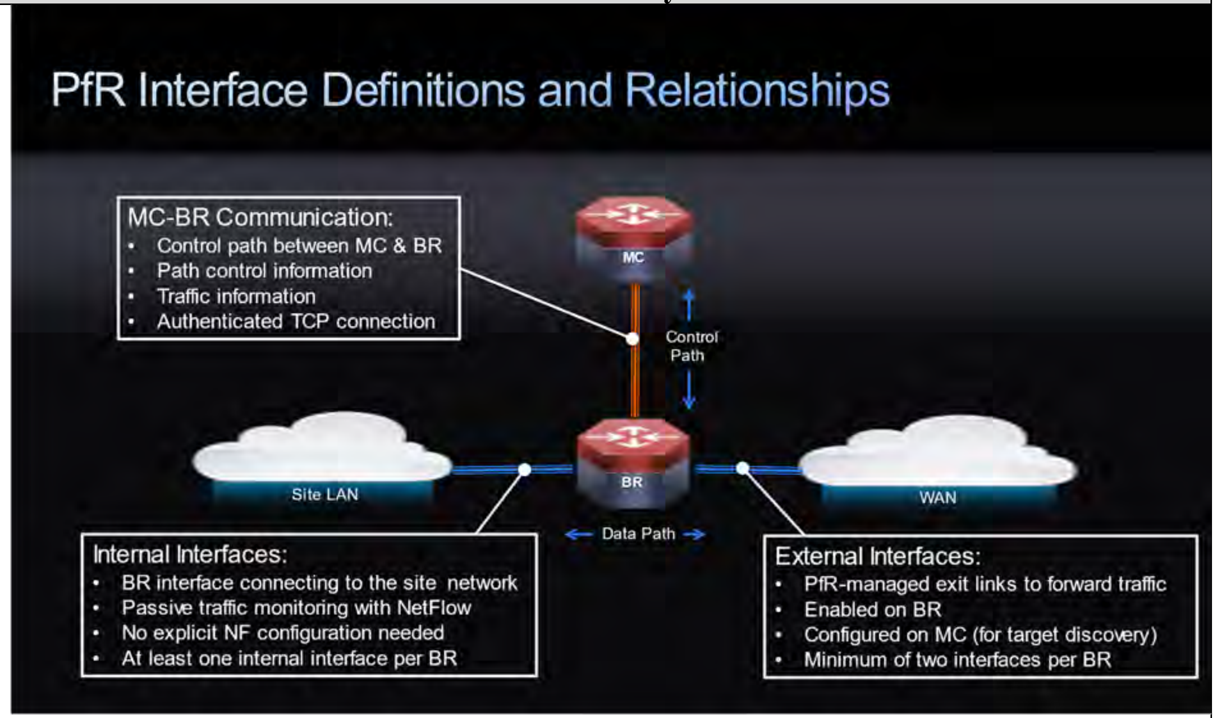
No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

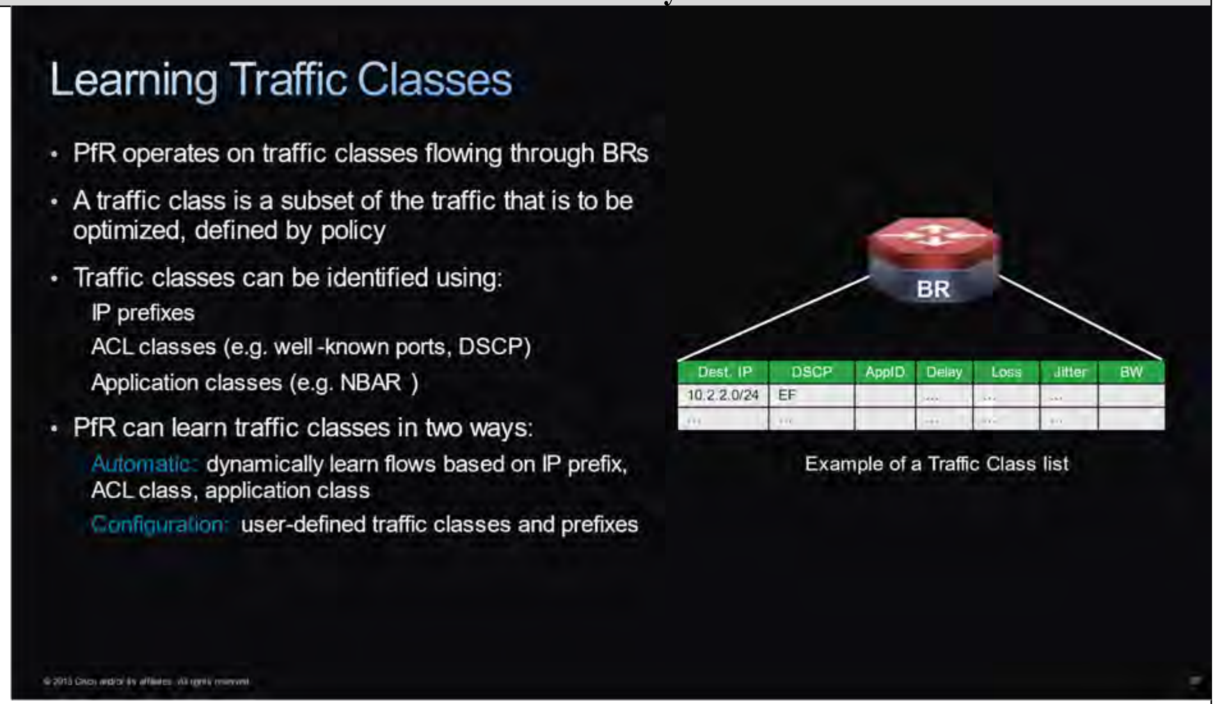
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

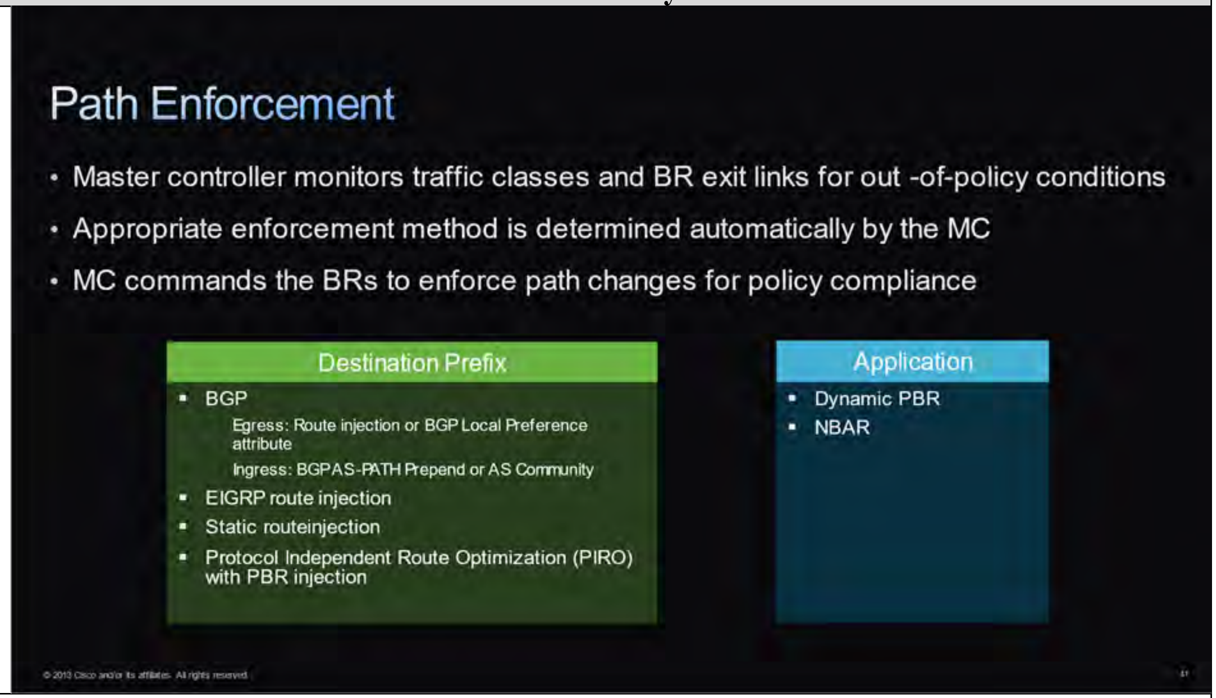
No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

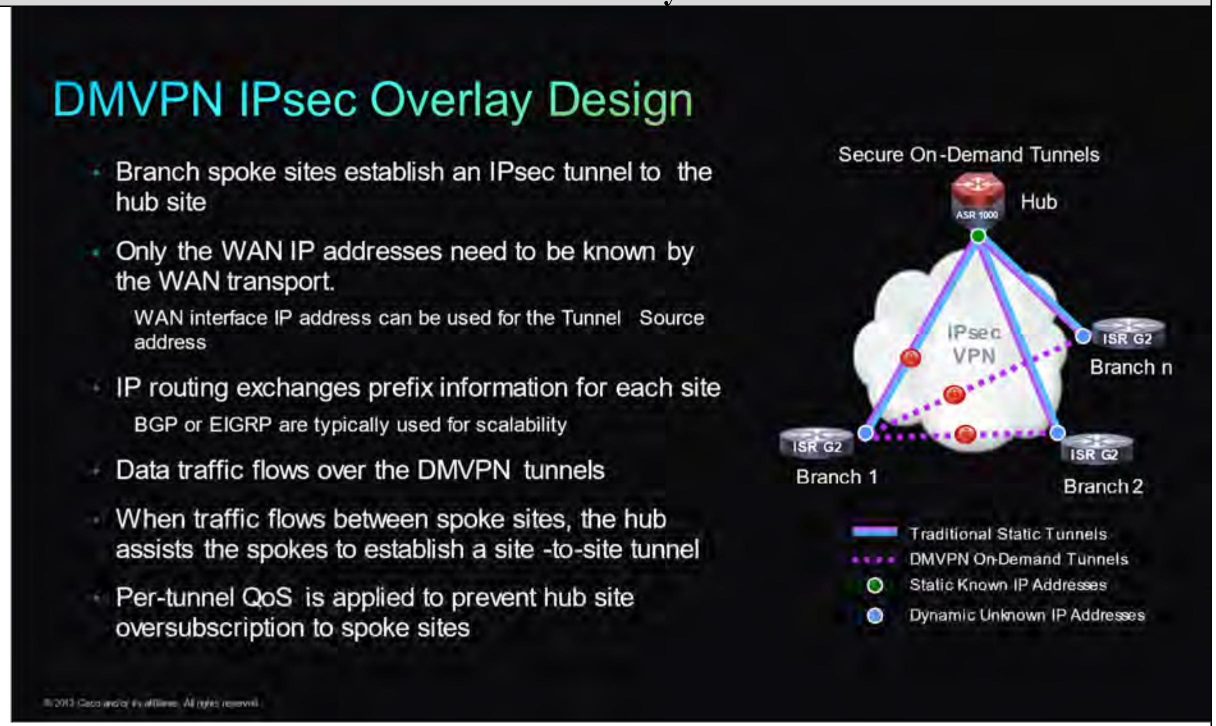
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

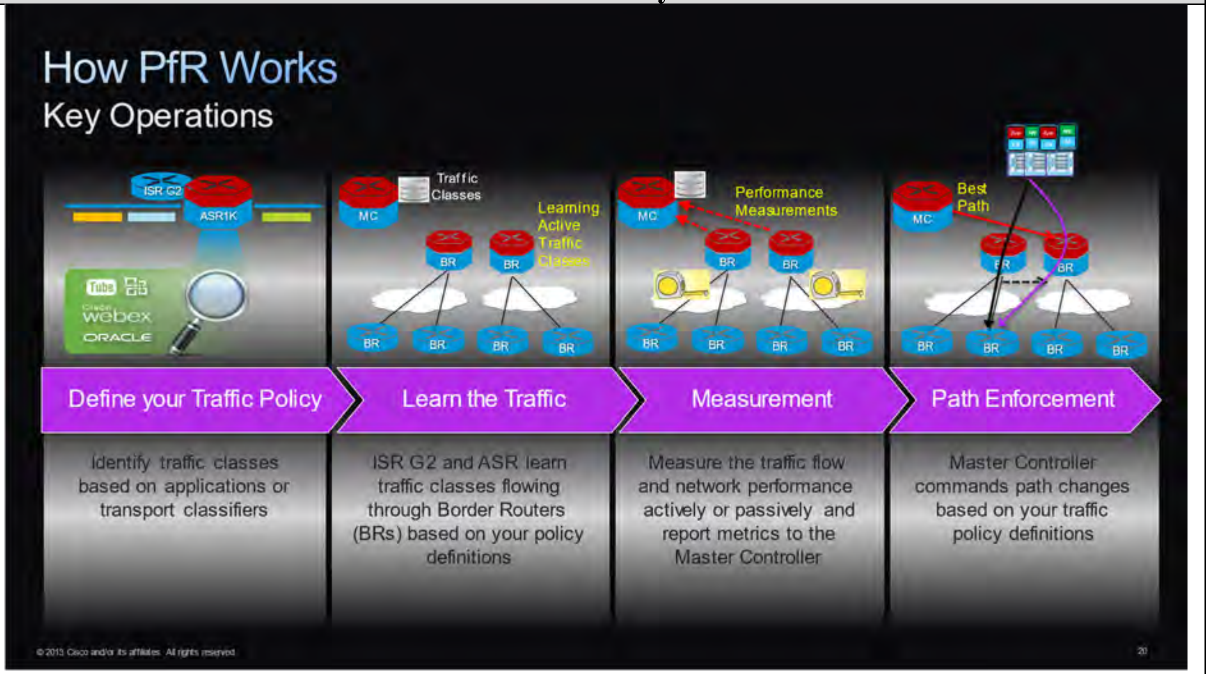
No.	'111 Patent Claim 1	Cisco IWAN System
		

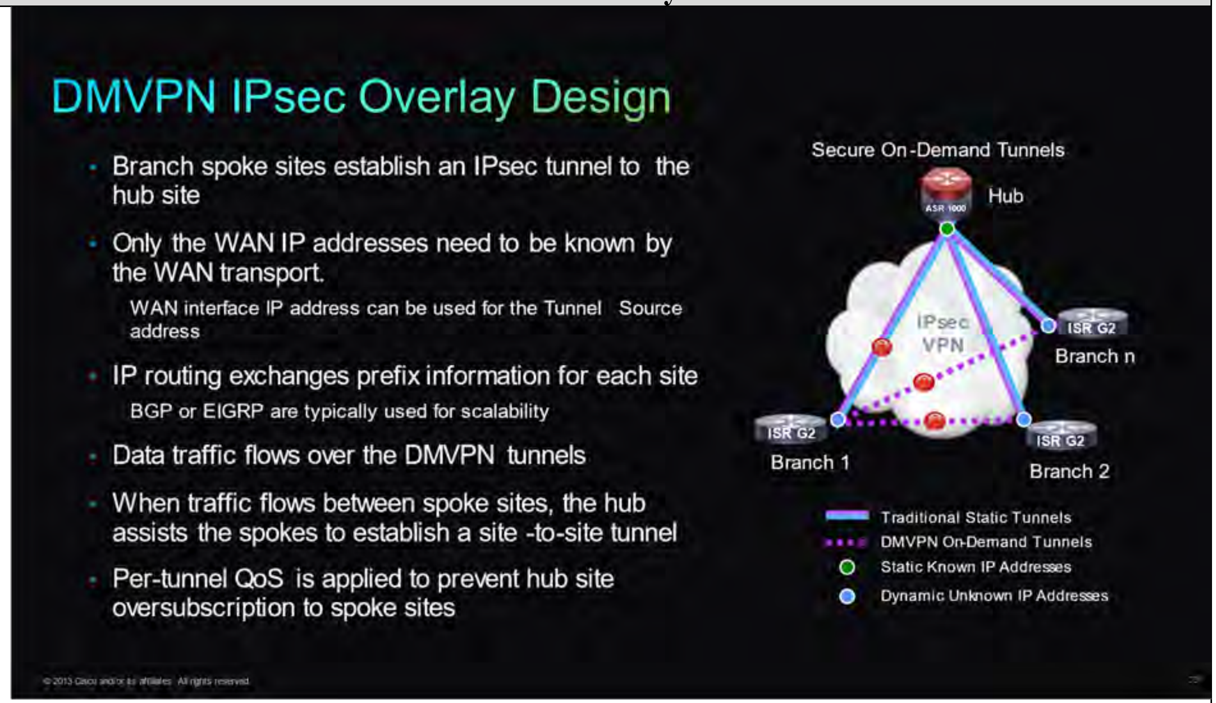
No.	'111 Patent Claim 1	Cisco IWAN System
		

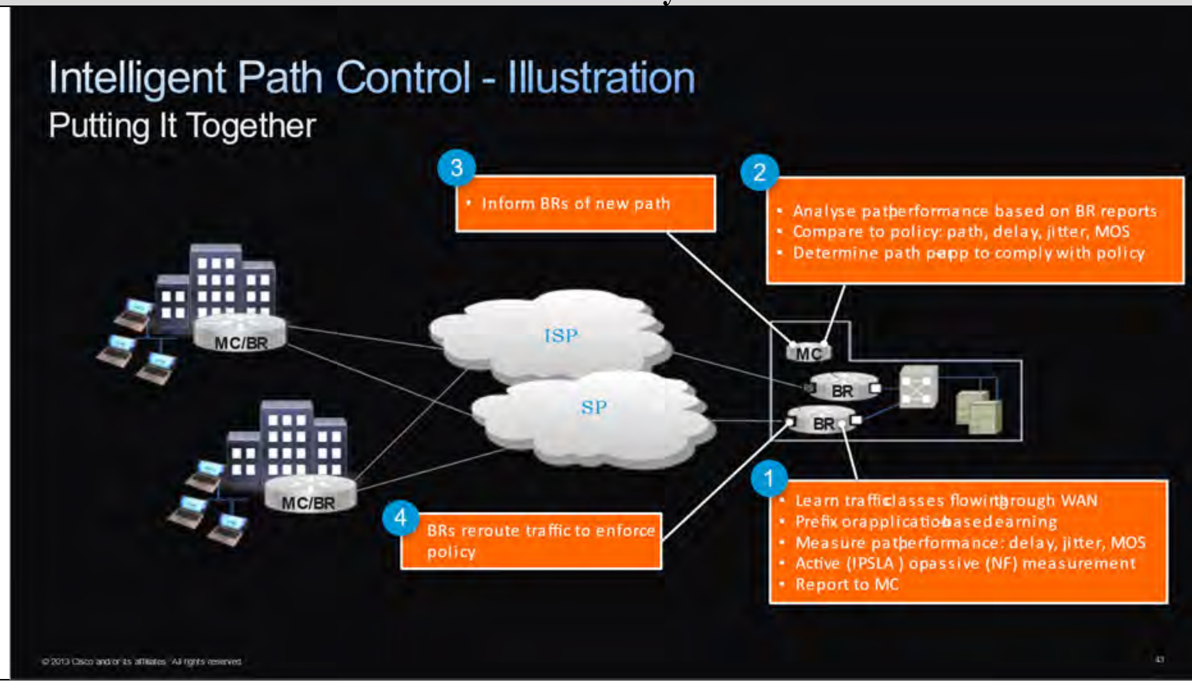
No.	’111 Patent Claim 1	Cisco IWAN System
		

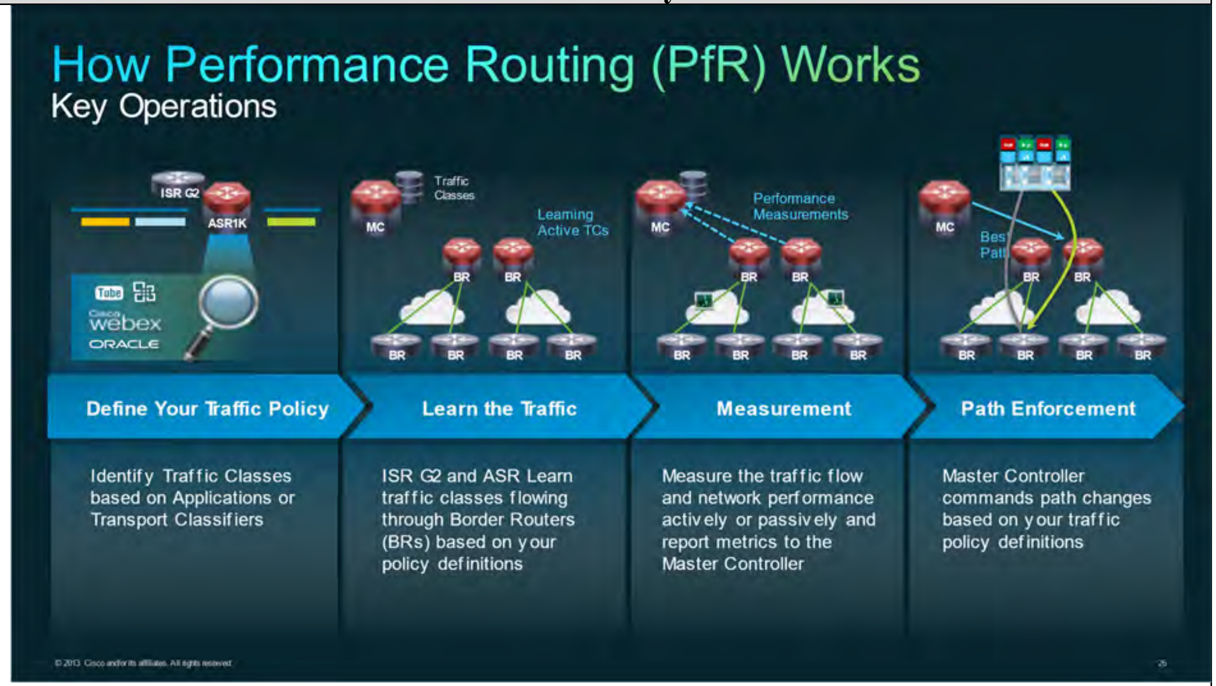
No.	'111 Patent Claim 1	Cisco IWAN System
		
1[b]	receiving, by the network node from the controller, the instruction and the criterion;	Cisco IWAN System discloses receiving, by the network node from the controller, the instruction and the criterion. *See supra at* 1[a].
1[c]	receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity;	Cisco IWAN System discloses receiving, by the network node from the first entity over the packet network, a packet addressed to the second entity. For example, Cisco IWAN System discloses receiving at a branch device/border router traffic flows between user devices directed to data center devices. Cisco IWAN

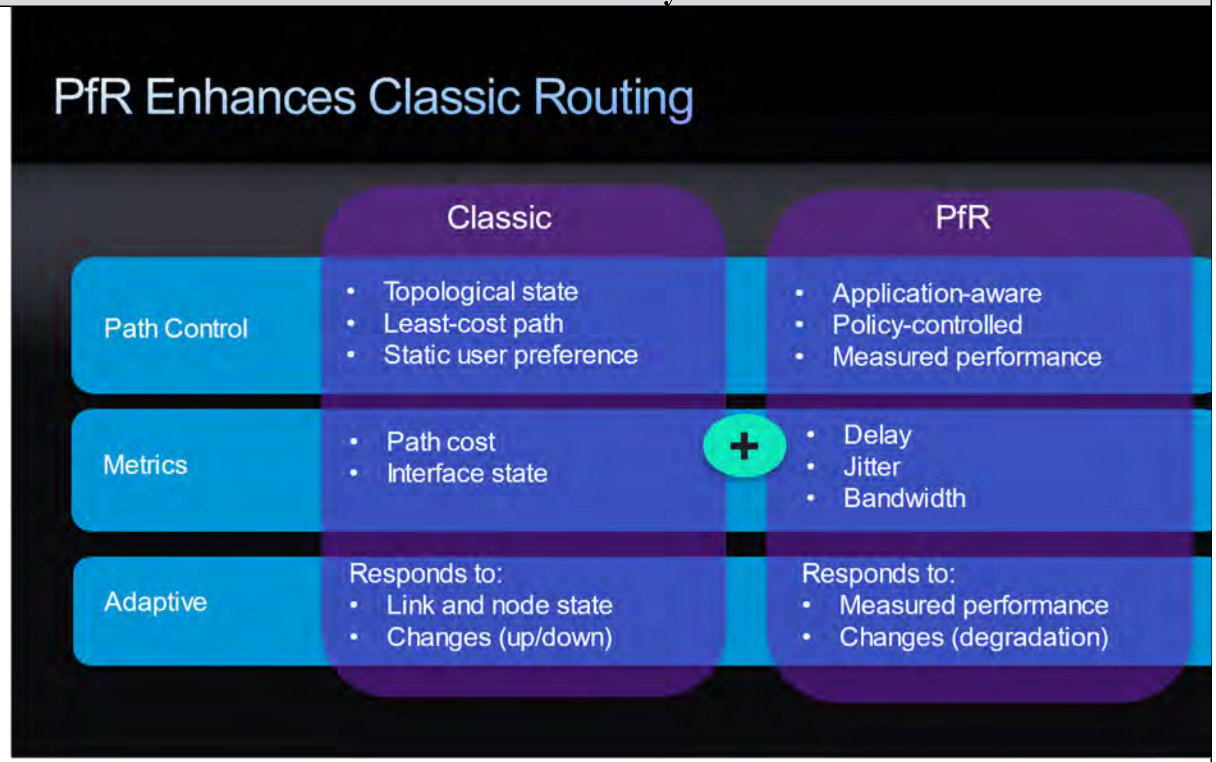
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

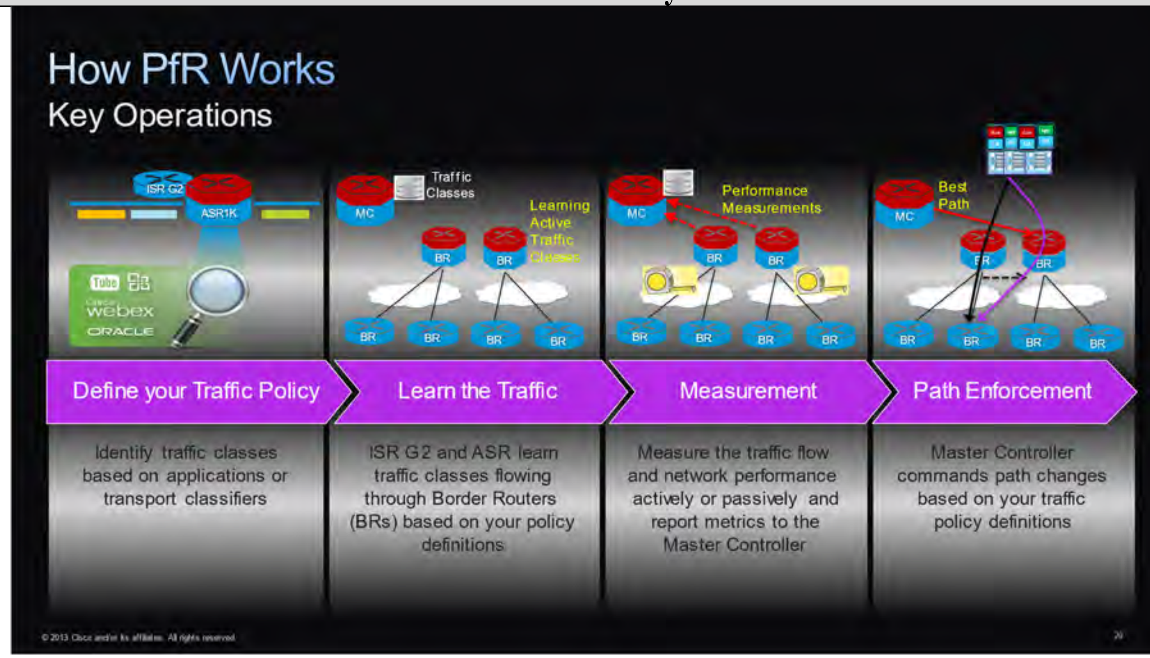
No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

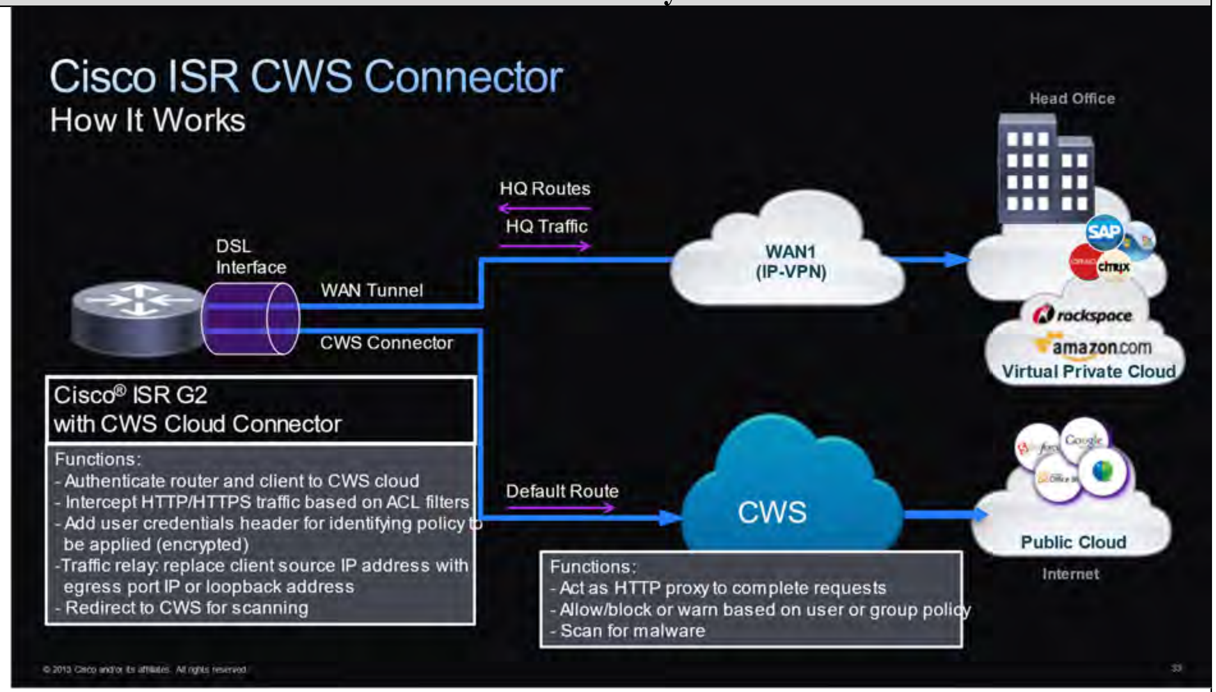
No.	’111 Patent Claim 1	Cisco IWAN System
		

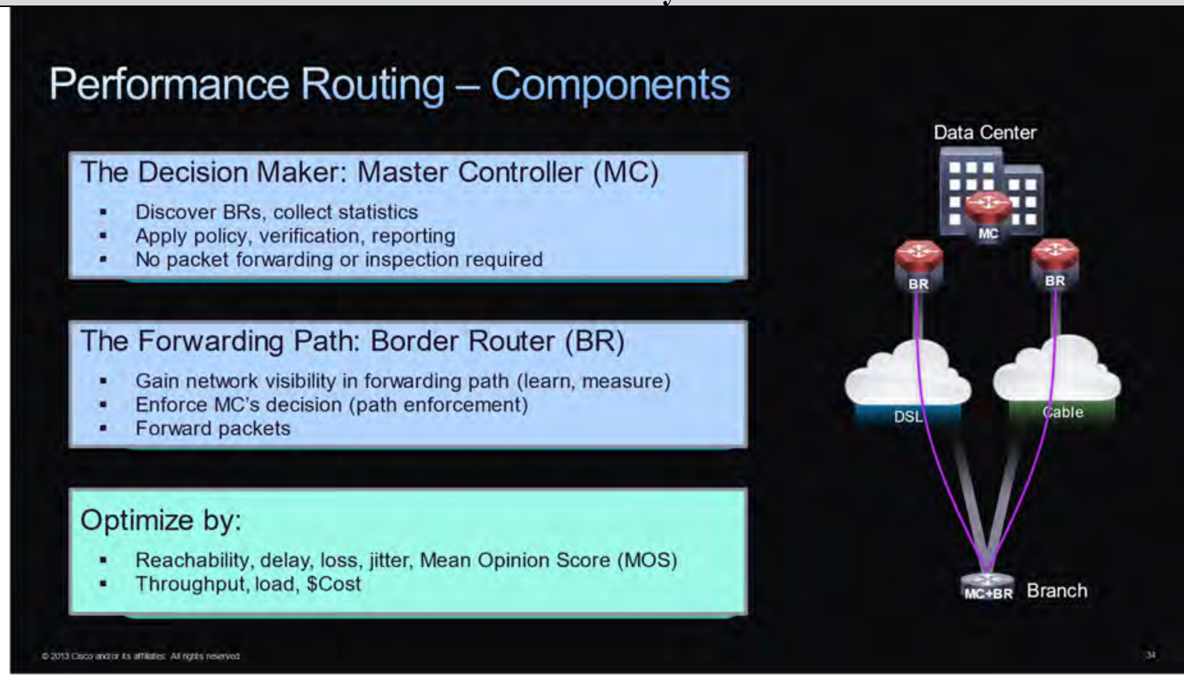
No.	’111 Patent Claim 1	Cisco IWAN System
		
1[d]	checking, by the network node, if the packet satisfies the criterion;	Cisco IWAN System discloses checking, by the network node, if the packet satisfies the criterion. For example, Cisco IWAN System discloses monitoring, learning, and measuring the traffic flows at the branch device/border router to determine whether the traffic flow meets traffic policy definitions. Cisco Next Generation

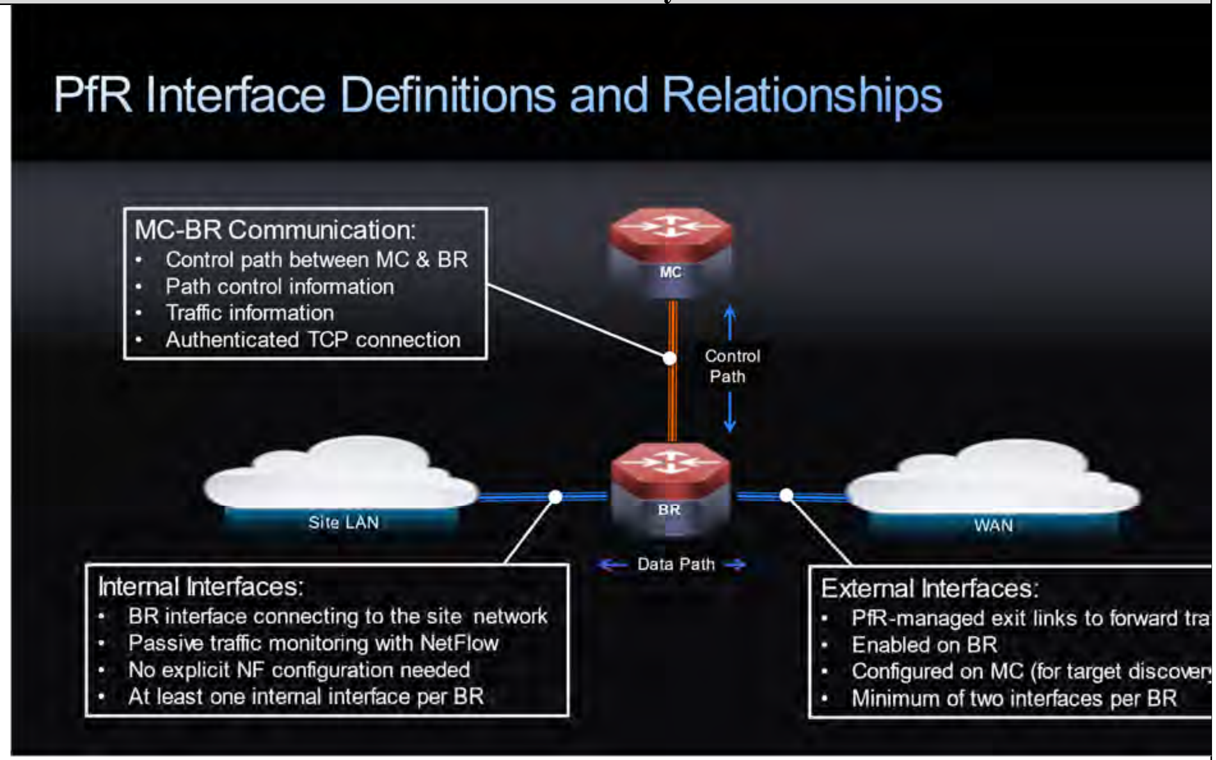
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

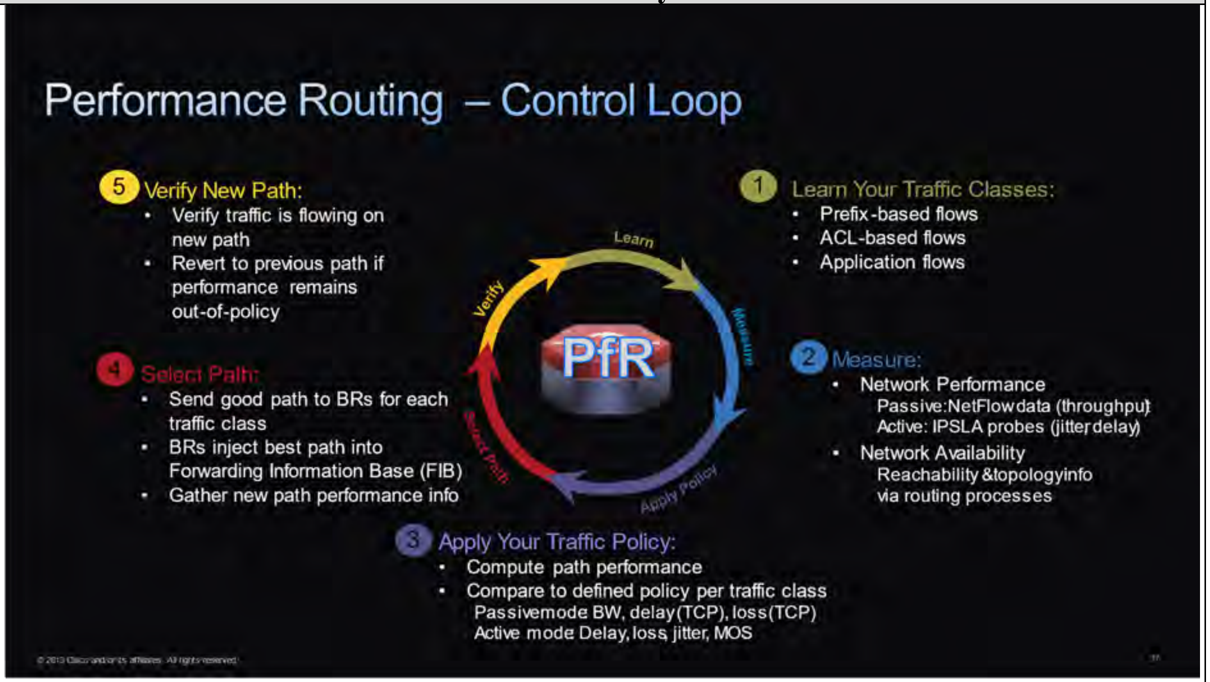
No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

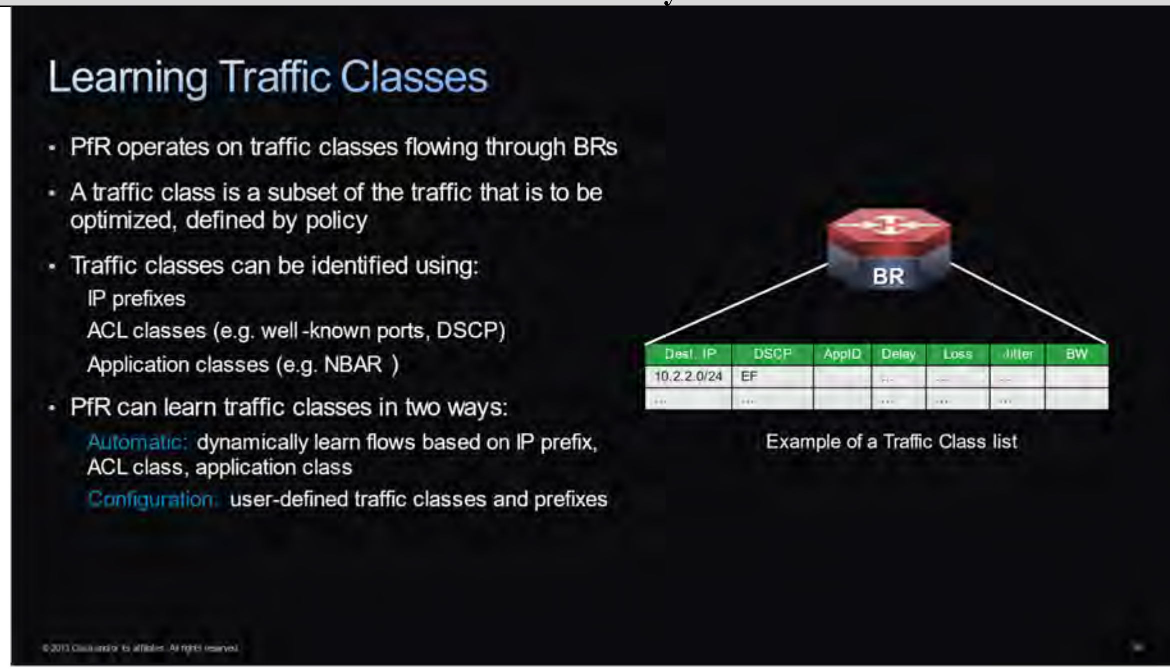
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN

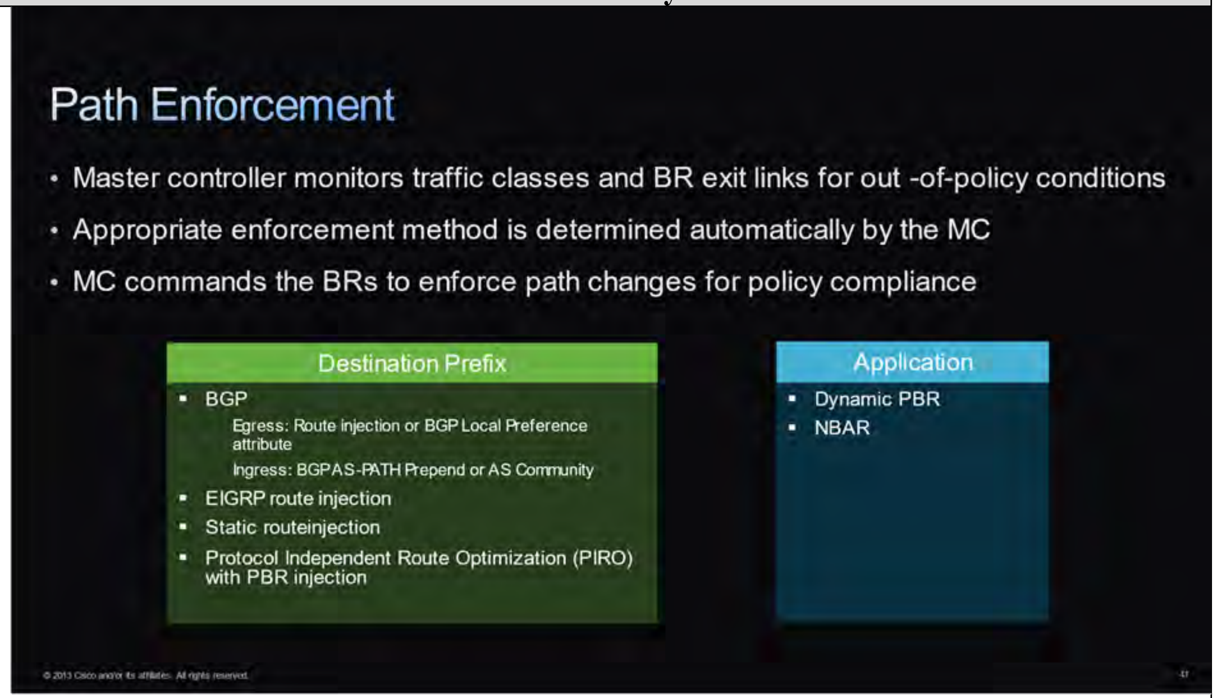
No.	’111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

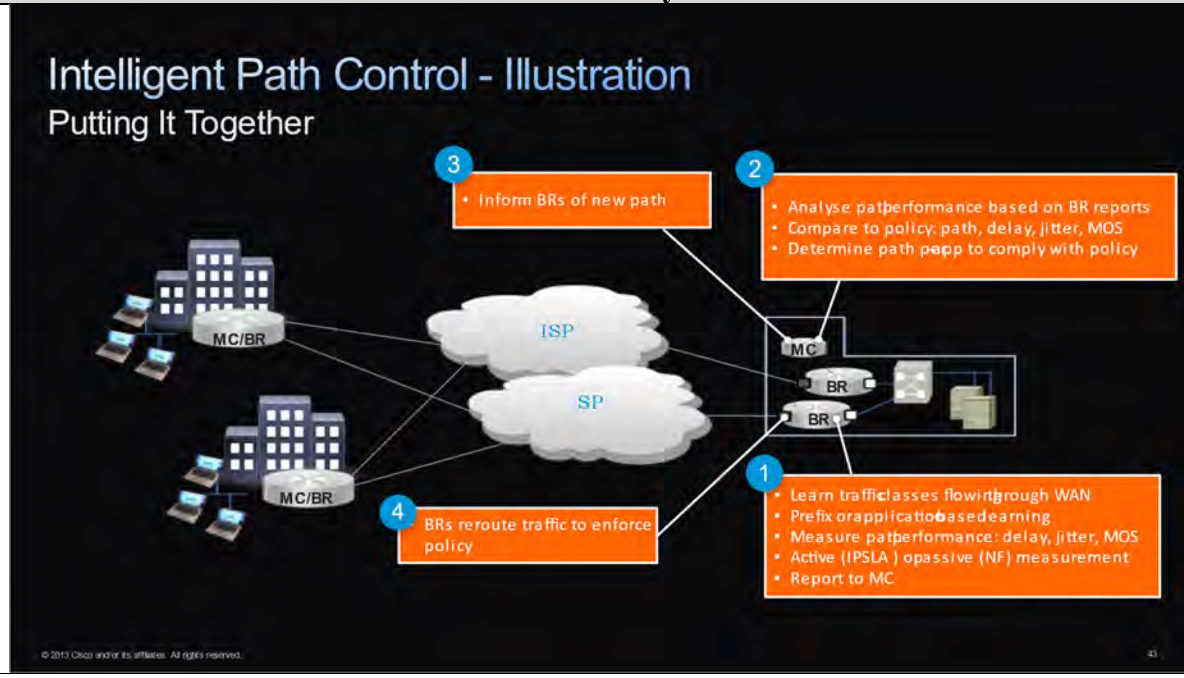
No.	'111 Patent Claim 1	Cisco IWAN System
		

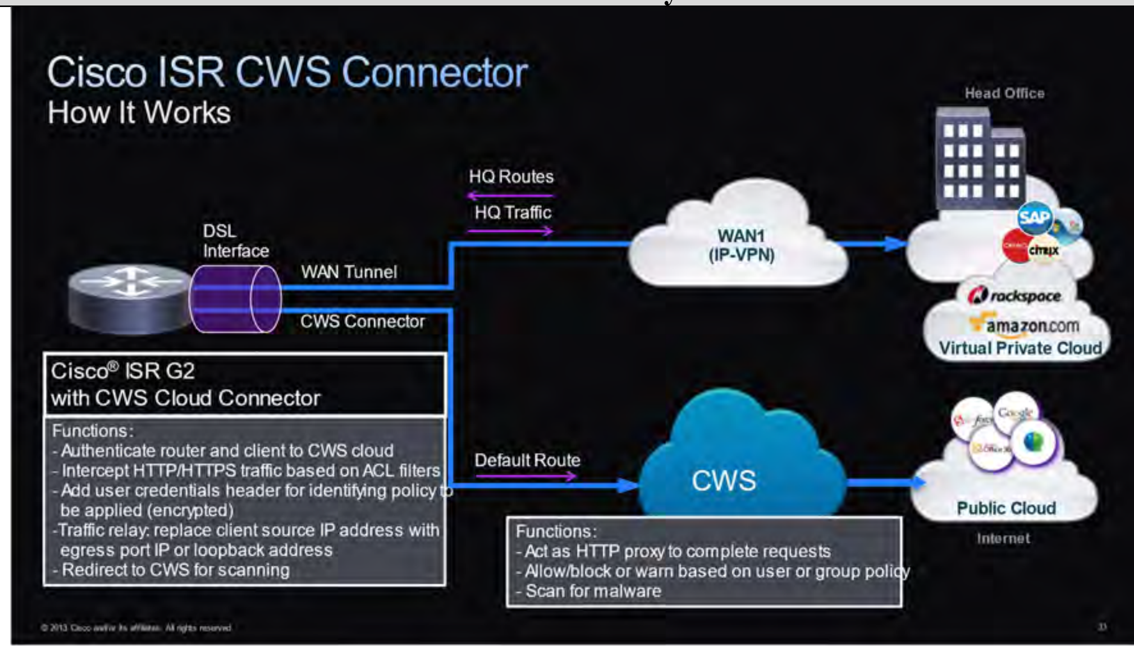
No.	’111 Patent Claim 1	Cisco IWAN System
		 7

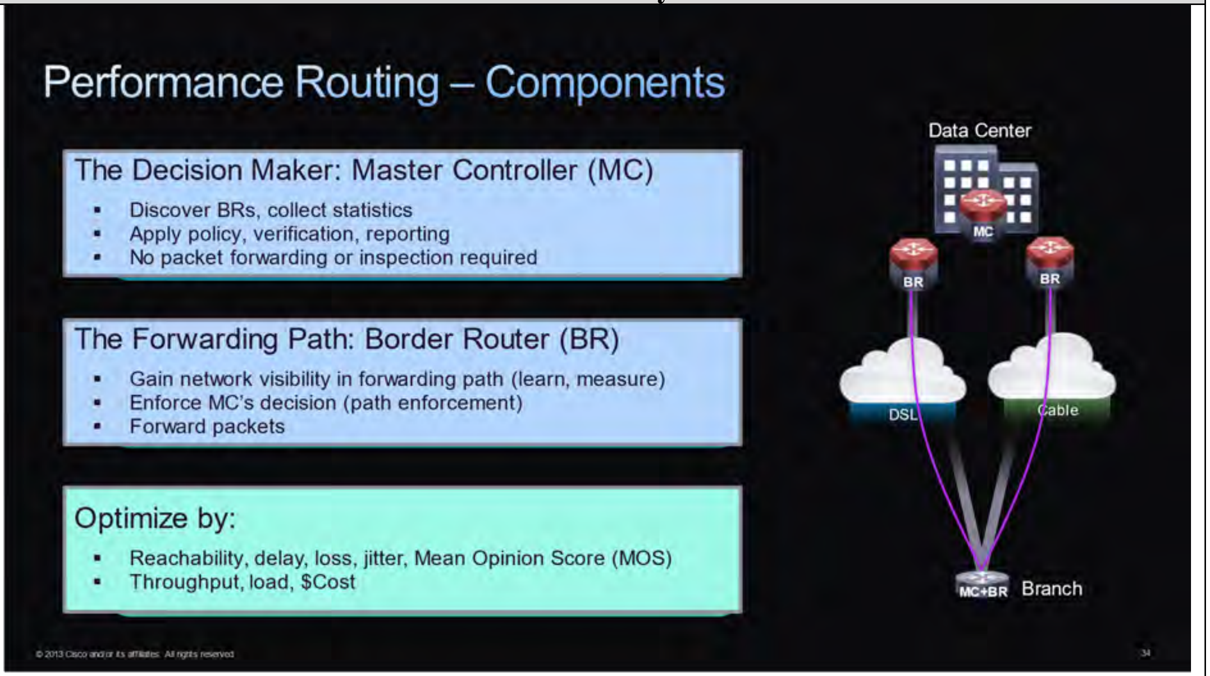
No.	'111 Patent Claim 1	Cisco IWAN System
		

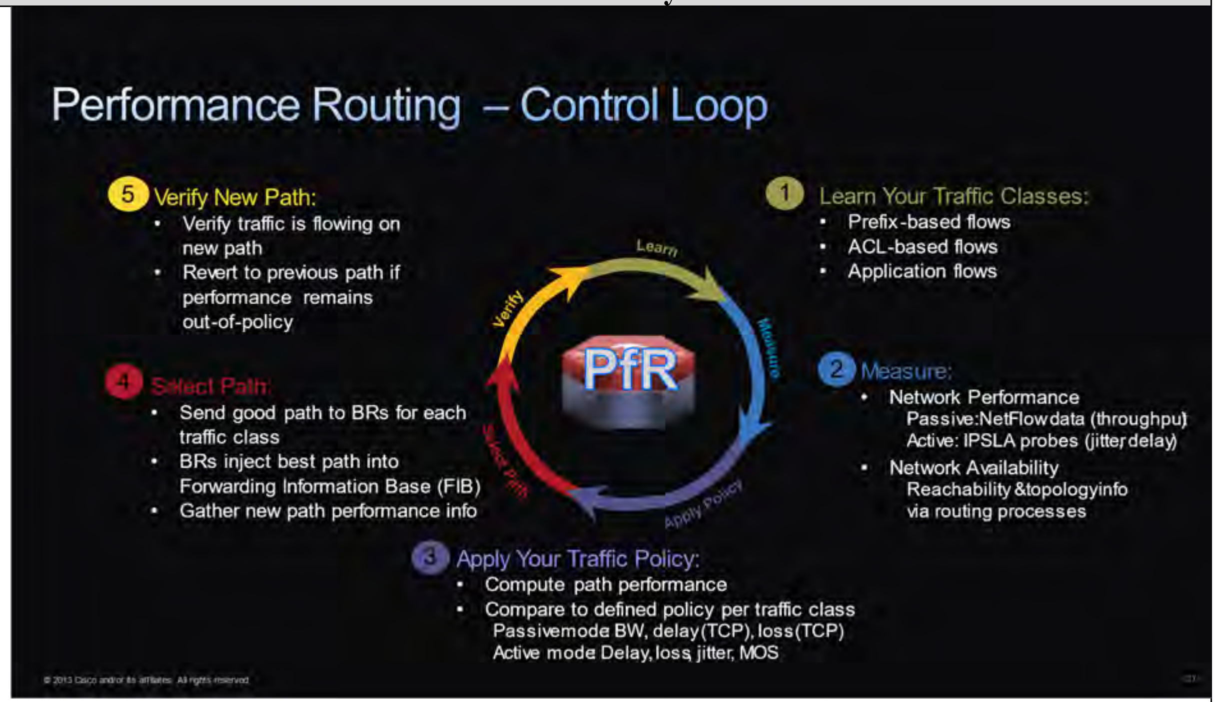
No.	’111 Patent Claim 1	Cisco IWAN System
		

No.	’111 Patent Claim 1	Cisco IWAN System
		

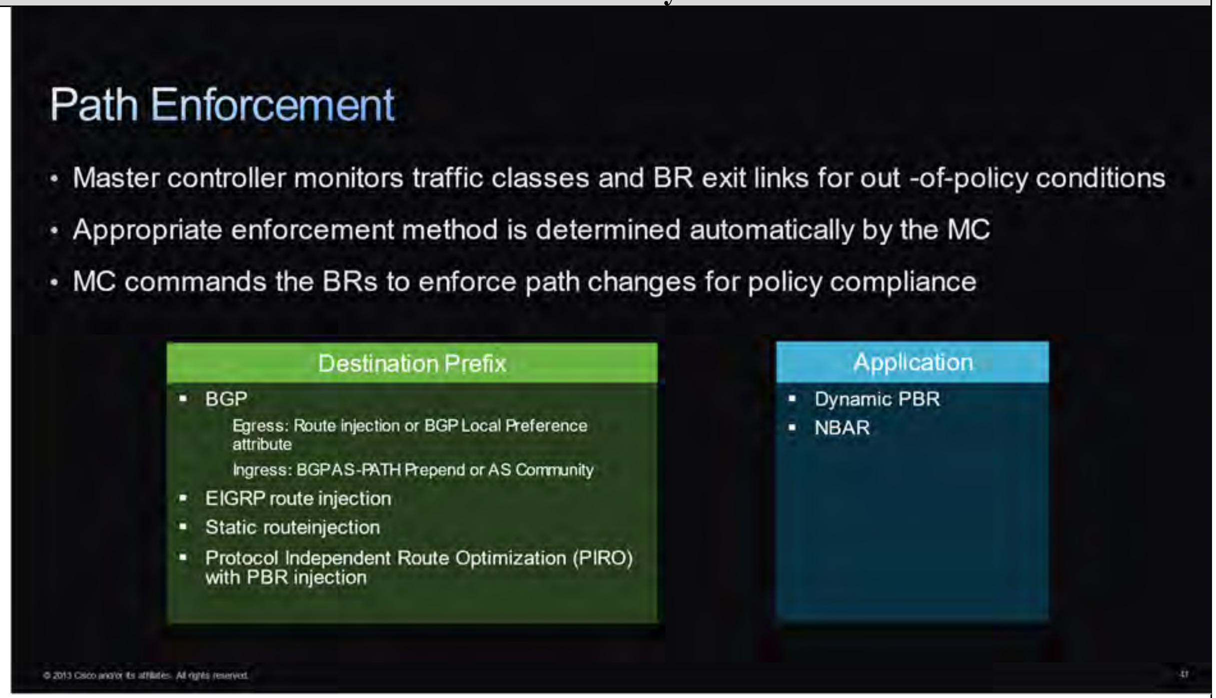
No.	’111 Patent Claim 1	Cisco IWAN System
		
1[e]	responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity; and	Cisco IWAN System discloses responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity. For example, Cisco IWAN System discloses relaying traffic by the branch device/border router to intended data center devices based on a particular traffic class. A person of ordinary skill in the art would understand that a packet not satisfying the criterion depends on the particular traffic policy definition and traffic class of the packet. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, responsive to the packet not satisfying the criterion, sending, by the network node over the packet network, the packet to the second entity would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN

No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	’111 Patent Claim 1	Cisco IWAN System
		

No.	'111 Patent Claim 1	Cisco IWAN System
		

No.	’111 Patent Claim 1	Cisco IWAN System



Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 1[e] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

For example, Kempf discloses sending the packet from the network element to the destination device in response to the packet not matching the action in the flow table.

Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device

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		that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table,

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		the actions in the matched rule include an action directing processing to the next table in the pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0051] (“FIG. 5 is a flowchart of one embodiment of the OpenFlow 1.1 rule matching process. OpenFlow 1.1 contains support for packet tagging. OpenFlow 1.1 allows matching based on header fields and multi-protocol label switching (MPLS) labels. One virtual LAN (VLAN) label and one MPLS label can be matched per table. The rule matching process is initiated with the arrival of a packet to be processed (Block 501). Starting at the first table 0 a lookup is performed to determine a match with the received packet (Block 503). If there is no match in this table, then one of a set of default actions is taken (i.e., send packet to controller, drop the packet or continue to next table) (Block 509). If there is a match, then an update to the action set is made along with counters, packet or match set fields and meta data (Block 505). A check is made to determine the next table to process, which can be the next table sequentially or one specified by an action of a matching rule (Block 507). Once all of the tables have been processed, then the resulting action set is executed (Block 511). FIG. 6 is a diagram of the fields, which a matching process can utilize for identifying rules to apply to a packet.”) Kempf at [0053] (“In one embodiment, a group table can be supported in conjunction with the OpenFlow 1.1 protocol. Group tables enable a method for allowing a single flow match to trigger forwarding on multiple ports. Group table entries consist of four fields: a group identifier, which is a 32 bit unsigned integer identifying the group; a group type that determines the group's semantics; counters that maintain statistics on the group; and an action bucket list, which is an ordered list of action buckets, where each bucket contains a set of actions to execute together with their parameters.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a

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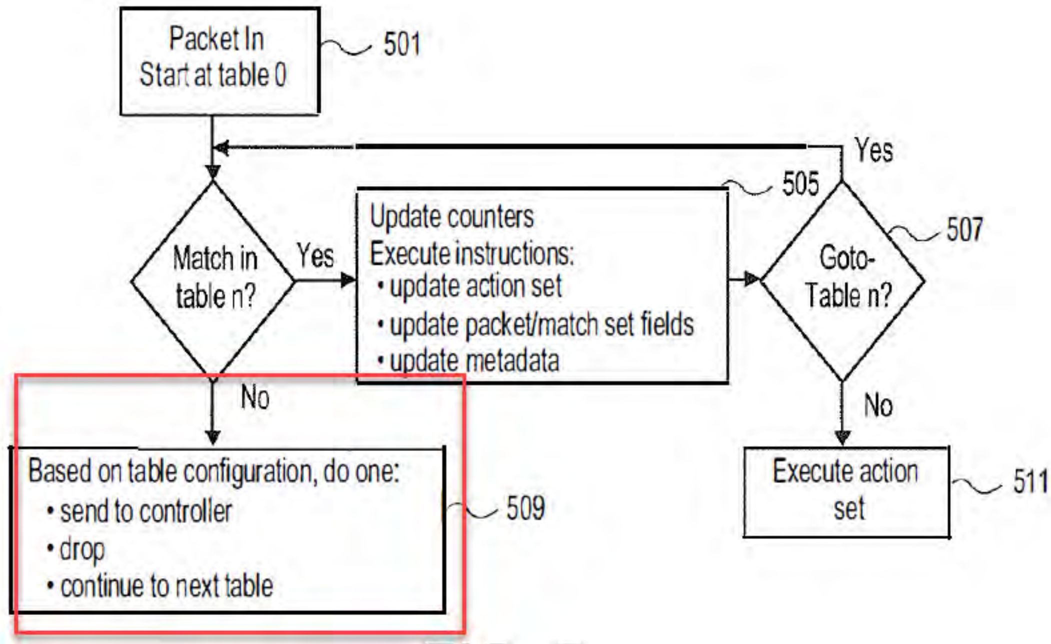
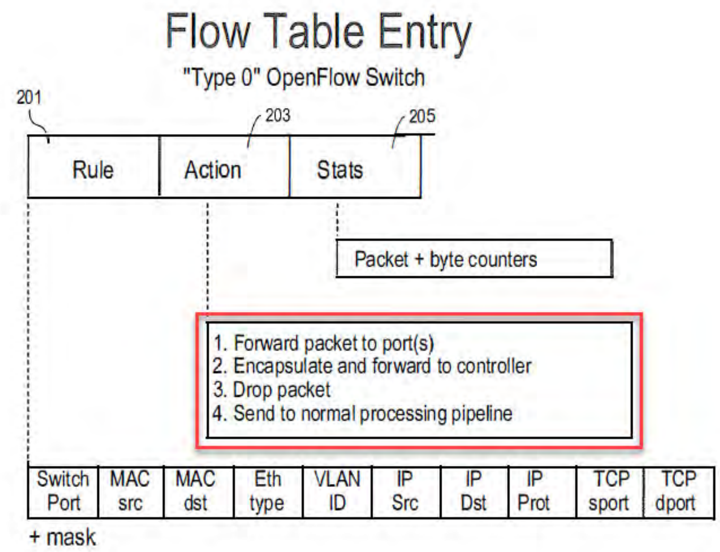
		GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at Figure 5 (annotation added)

No.	'111 Patent Claim 1	Cisco IWAN System
		 FIG. 5 Kempf at Figure 2 (annotation added)

No.	'111 Patent Claim 1	Cisco IWAN System
		 FIG. 2 As another example, Swenson discloses monitoring and categorizing network traffic by the steering device based on instructions and desired criteria sent by the network controller to determine if packet flows require further inspection. Based on the instruction and desired criteria, the network controller monitors and optimizes only a subset of network traffic. Packet flows that do not meet the desired criteria from the network controller's instructions at the steering device are not sent for further inspection and are sent to their originally intended destination. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering

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		device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and

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		optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0042] (“The network controller 140 collects real-time statis-tical data on the network flows from core network side with-out probes deployed in the RAN network. The statistical data is stored and compared against historical flow data to estimate level of congestion and available network bandwidth. Instead of collecting traffic statistics for every flow and every session, the network controller 140 samples only large flows involving media objects such as videos and images above a certain size (e.g., above 50 kB). The network controller 140 can choose to be a pass-through device to monitor the large flows as well as to determine whether to optimize the flows. Measuring only larger flows has the advantage to mitigate corruptions caused by origin server latency and network glitches. Furthermore, focusing on the large flows helps the network controller to reduce the background noise and to increase noise-to-signal ratio in bandwidth measuring by removing the impact of millions of tiny or small flows with delivery time in millisec-onds. Therefore the reliability of bandwidth estimation and congestion detection is much higher.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images.

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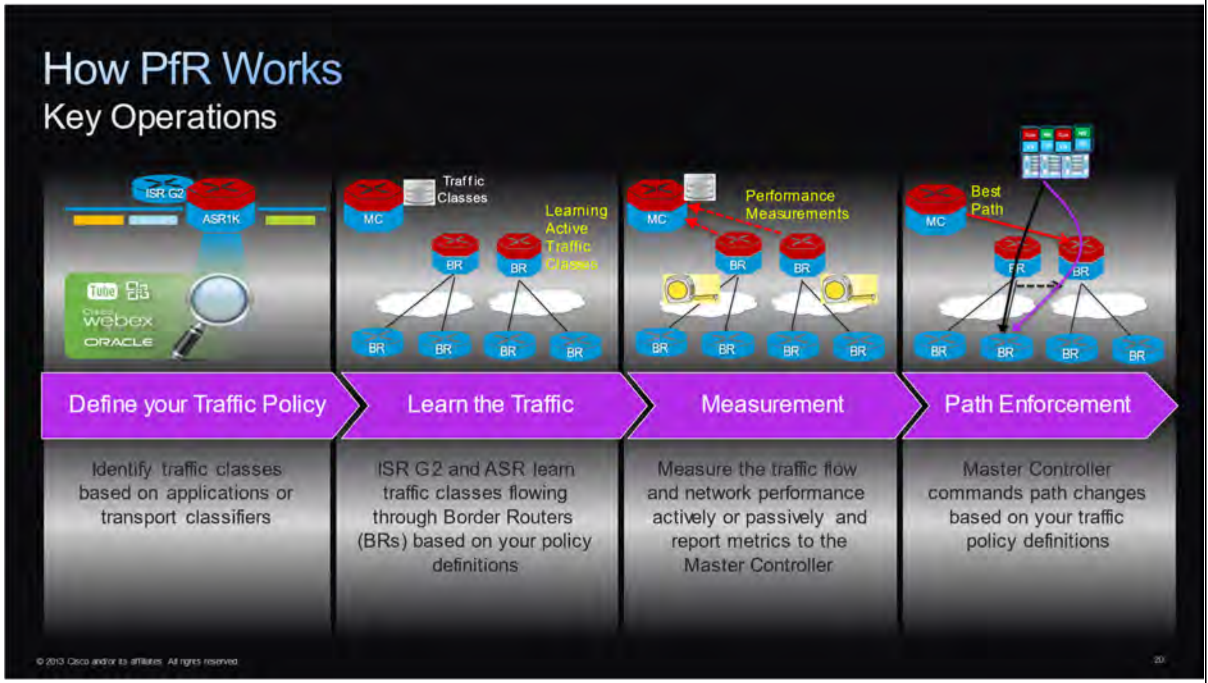
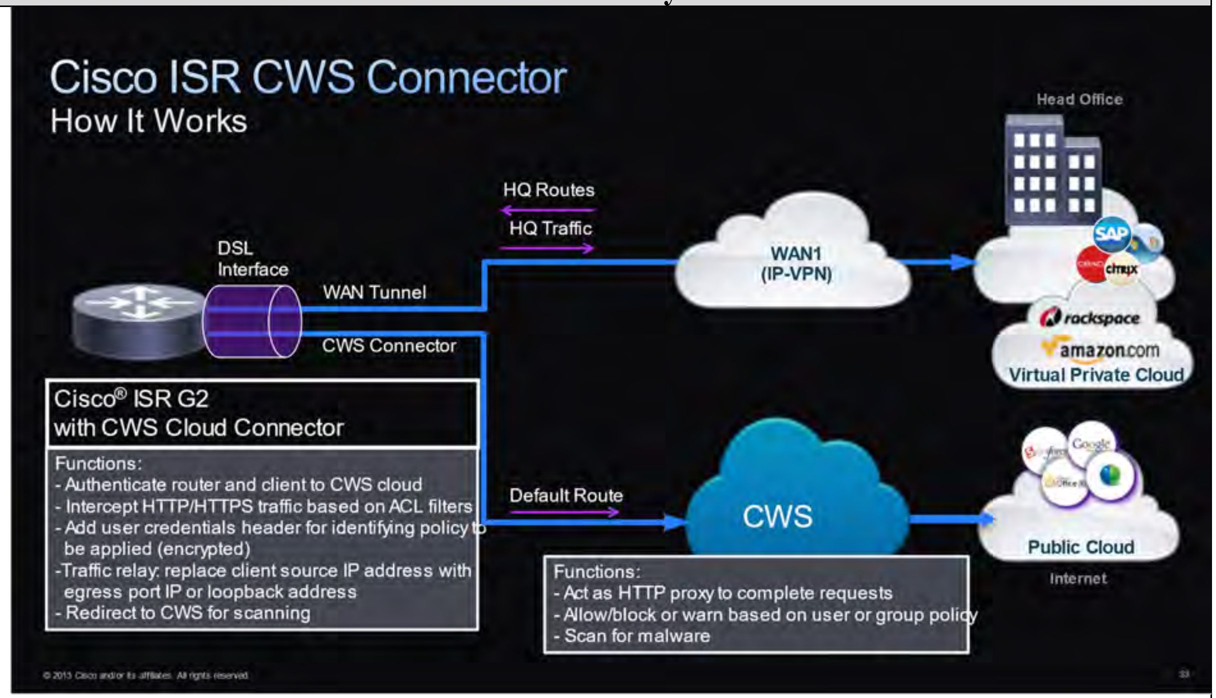
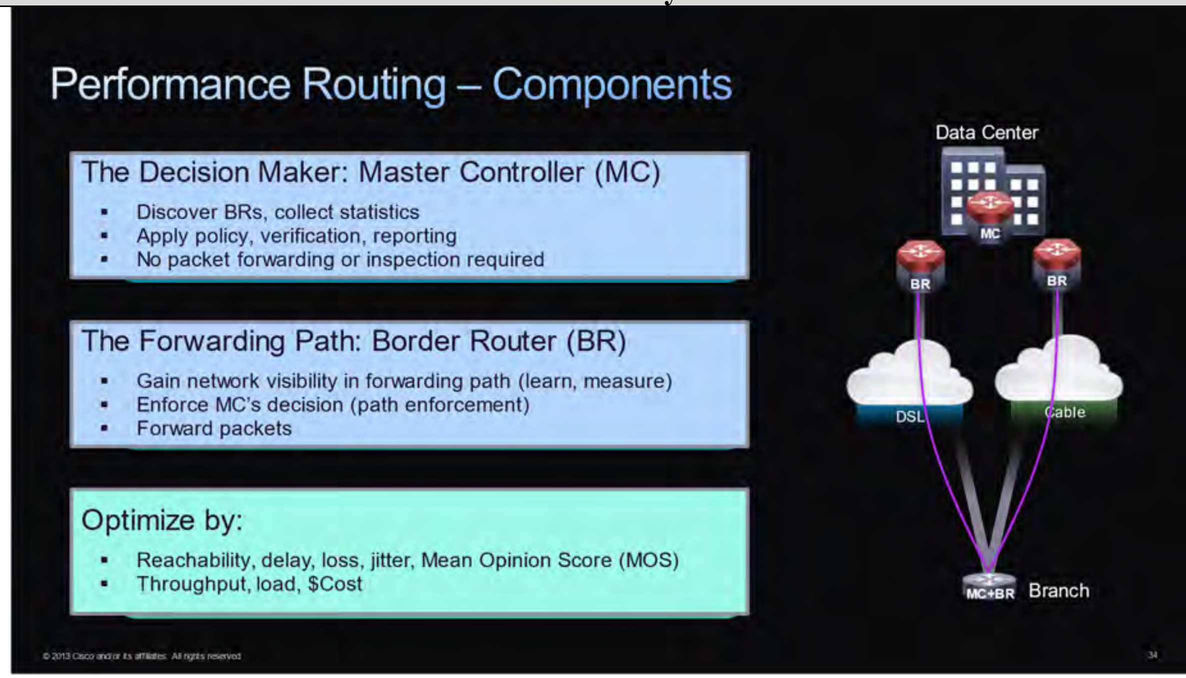
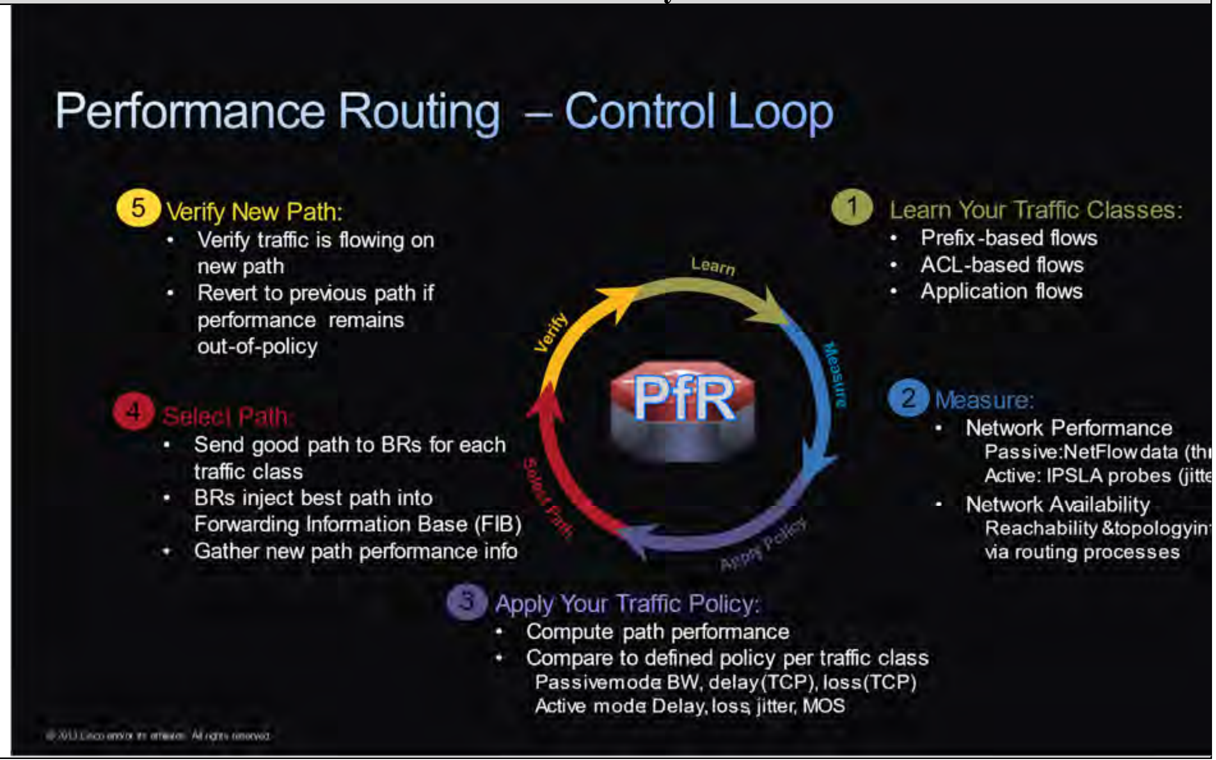
		When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this

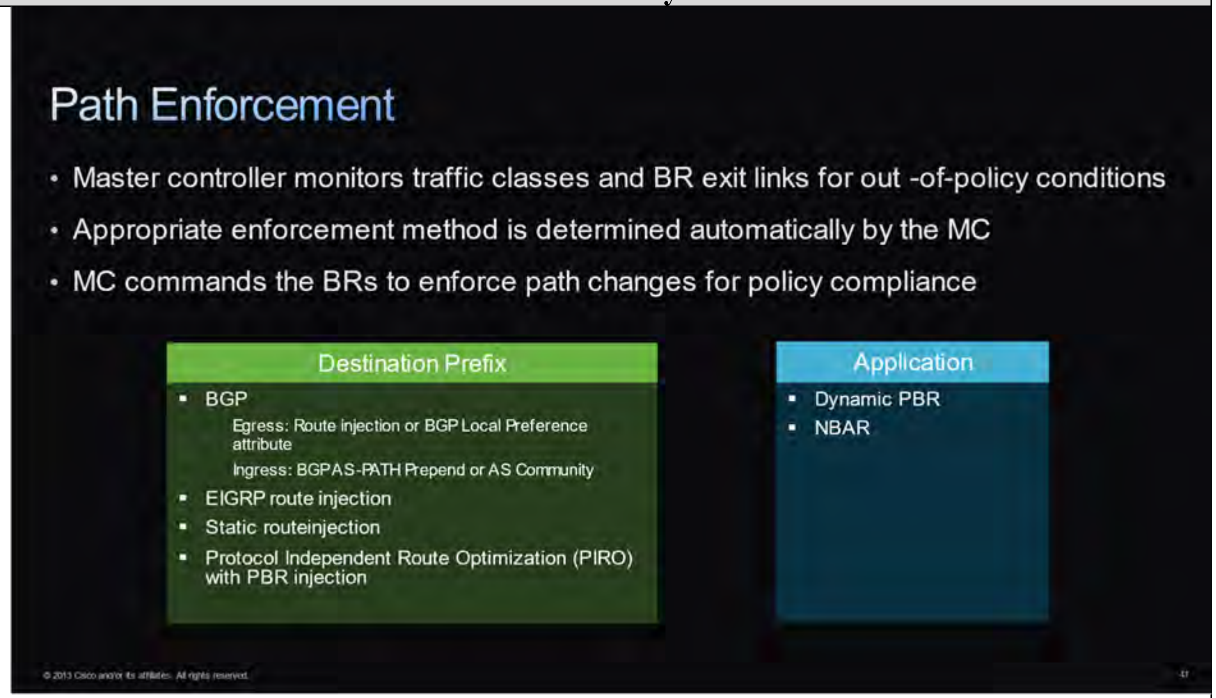
No.	’111 Patent Claim 1	Cisco IWAN System
		case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)
1[f]	responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the	Cisco IWAN System discloses responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity. For example, Cisco IWAN System discloses sending traffic flow metrics to the hub/master controller by the branch device/border router based on a particular traffic class. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this

No.	'111 Patent Claim 1	Cisco IWAN System
	instruction and is other than the second entity.	limitation, responsive to the packet satisfying the criterion, sending the packet, by the network node over the packet network, to an entity that is included in the instruction and is other than the second entity would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN  Cisco IWAN

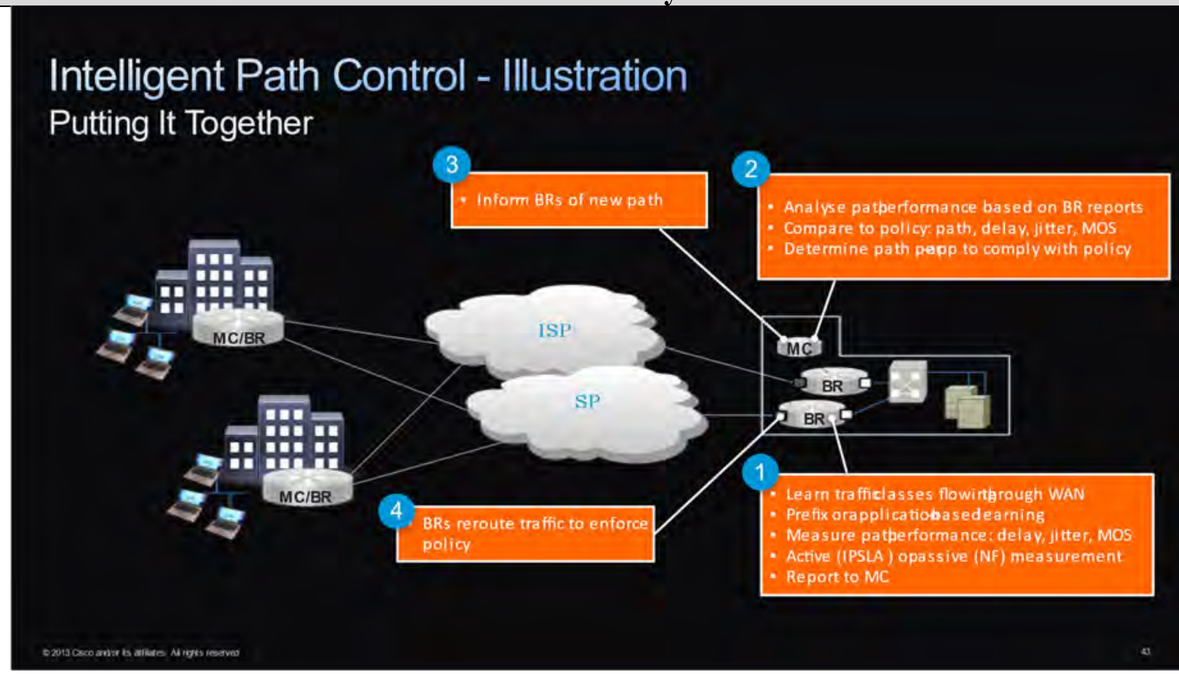
No.	'111 Patent Claim 1	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	'111 Patent Claim 1	Cisco IWAN System
		

No.	’111 Patent Claim 1	Cisco IWAN System
		

No.	’111 Patent Claim 1	Cisco IWAN System
		

No.	’111 Patent Claim 1	Cisco IWAN System



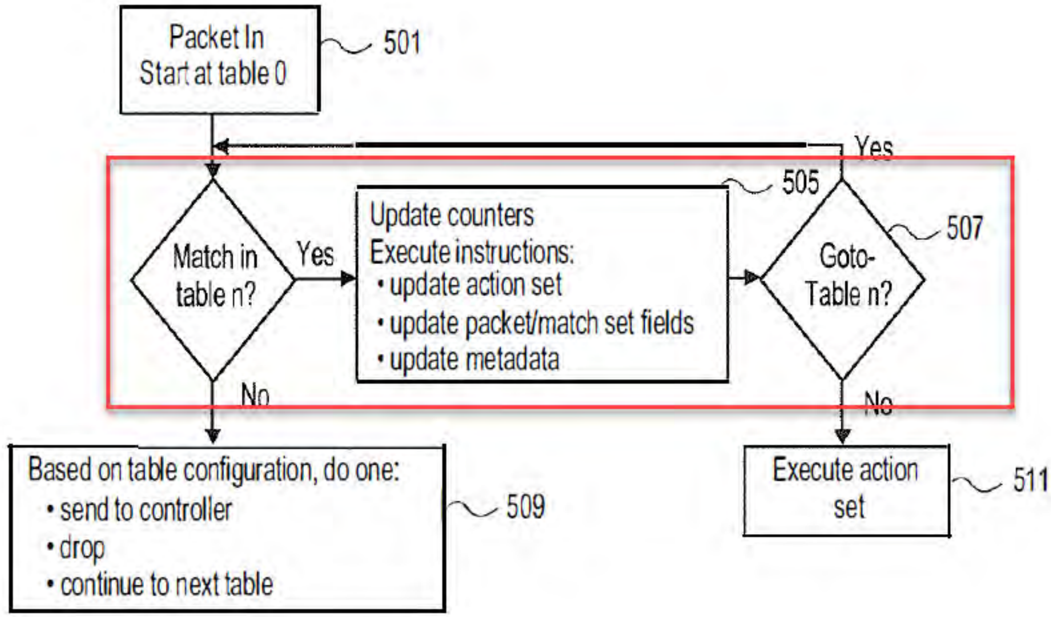
Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 1[f] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

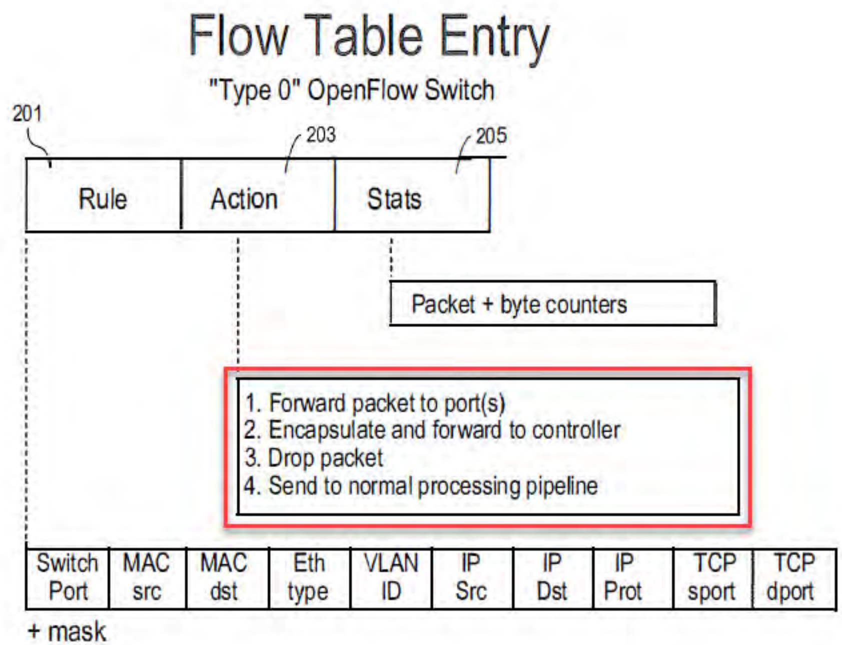
For example, Kempf discloses sending the packet from the network element to the controller or another table, in response to the packet matching the action in the flow table.

Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can

No.	'111 Patent Claim 1	Cisco IWAN System
		be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.") Kempf at [0045] ("FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.") Kempf at [0046] ("A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.") Kempf at [0047] ("The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.") Kempf at [0050] ("FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the

No.	’111 Patent Claim 1	Cisco IWAN System
		pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0106] (“This encapsulates the packet and sends it to the OpenFlow controller.”) Kempf at Figure 5 (annotation added)

No.	'111 Patent Claim 1	Cisco IWAN System
		 FIG. 5 Kempf at Figure 2 (annotation added)

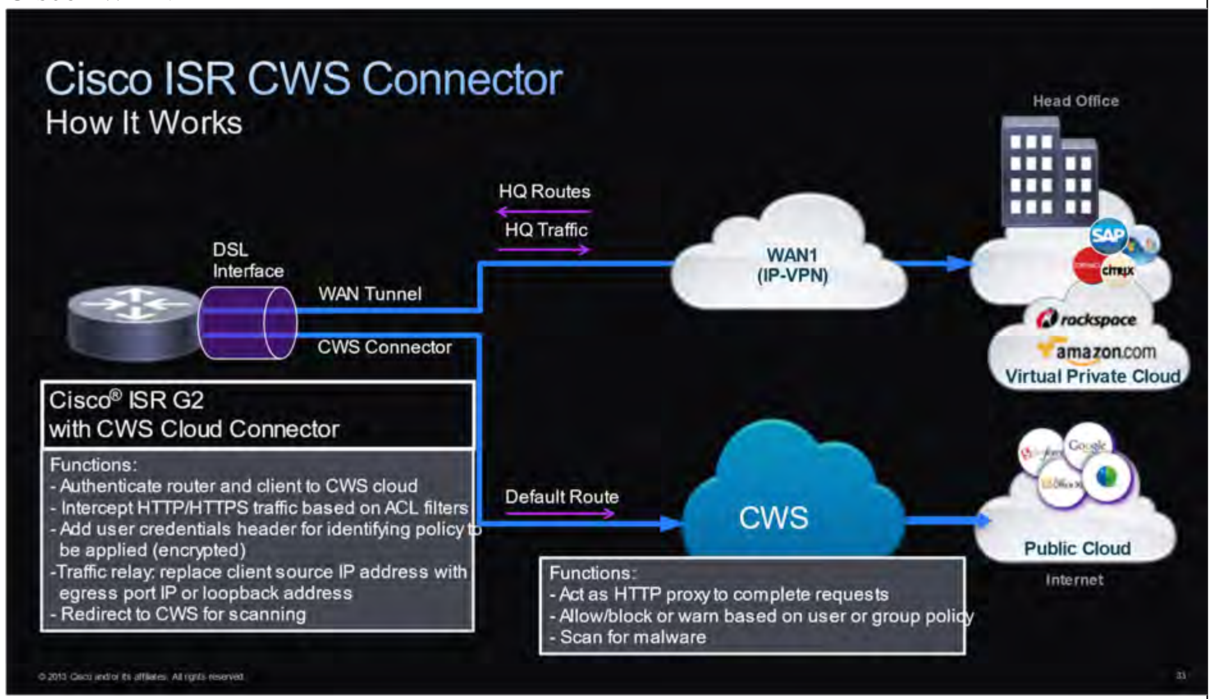
No.	'111 Patent Claim 1	Cisco IWAN System
		 **FIG. 2** For example, Swenson discloses determining by the steering device monitors flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the packet to the network controller. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further

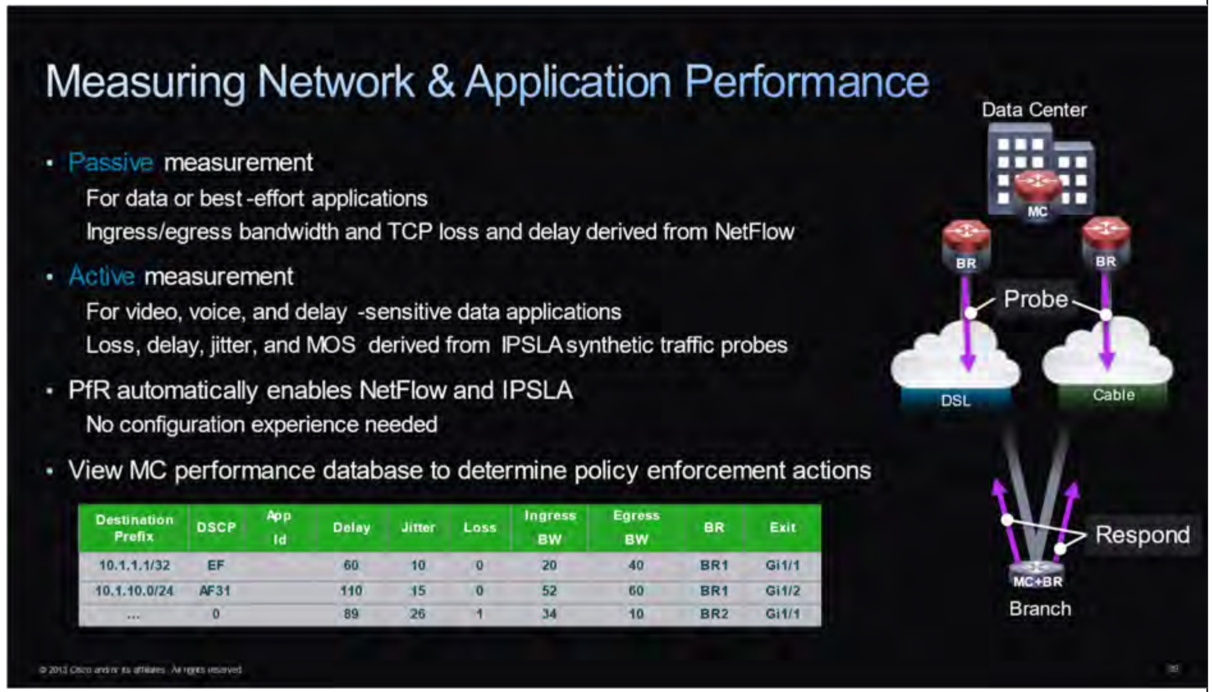
No.	’111 Patent Claim 1	Cisco IWAN System
		inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The

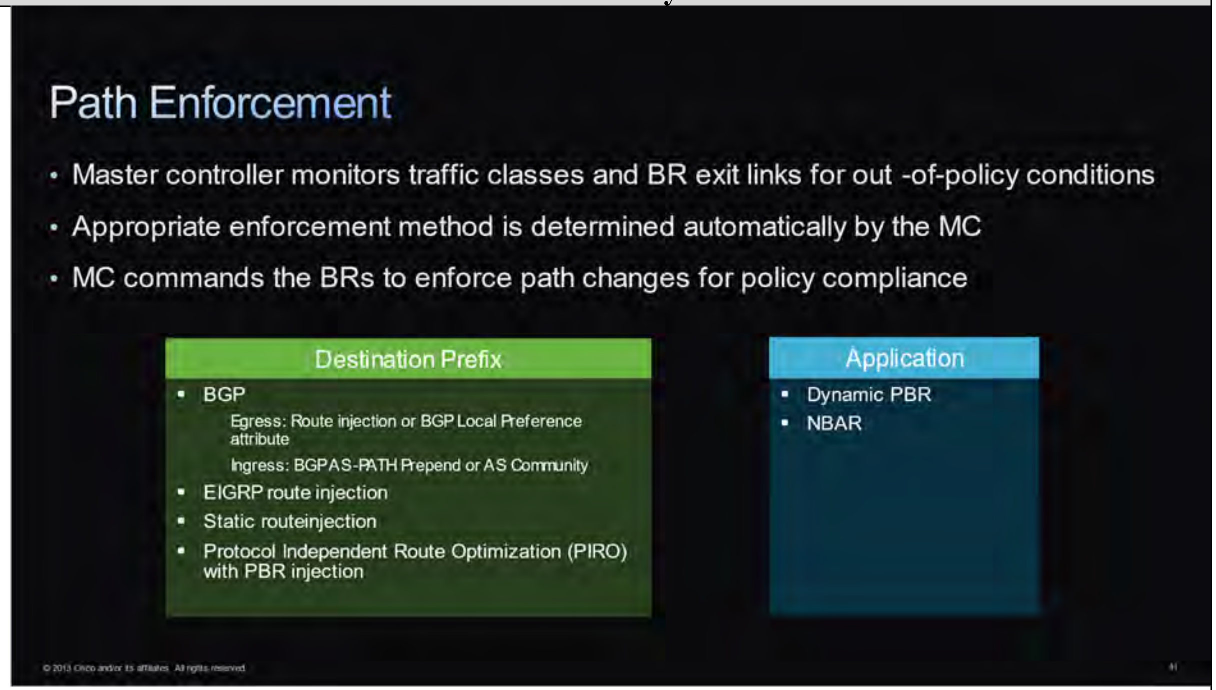
No.	’111 Patent Claim 1	Cisco IWAN System
		network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the

No.	’111 Patent Claim 1	Cisco IWAN System
		network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user

No.	’111 Patent Claim 1	Cisco IWAN System
		device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

No.	’111 Patent Claim 2	Cisco IWAN System
2[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Cisco IWAN System discloses the method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction. For example, Cisco IWAN System discloses traffic policies sent by the hub/master controller to the branch devices/border routers, including probing, forwarding, and blocking policies. A person of ordinary skill in the art would understand that such traffic policies could include any number of definitions including ‘probe’, ‘mirror’, and ‘terminate’. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, wherein the instruction is ‘probe’, ‘mirror', or ‘terminate’ instruction would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN  Cisco IWAN - Uncompromised Experience

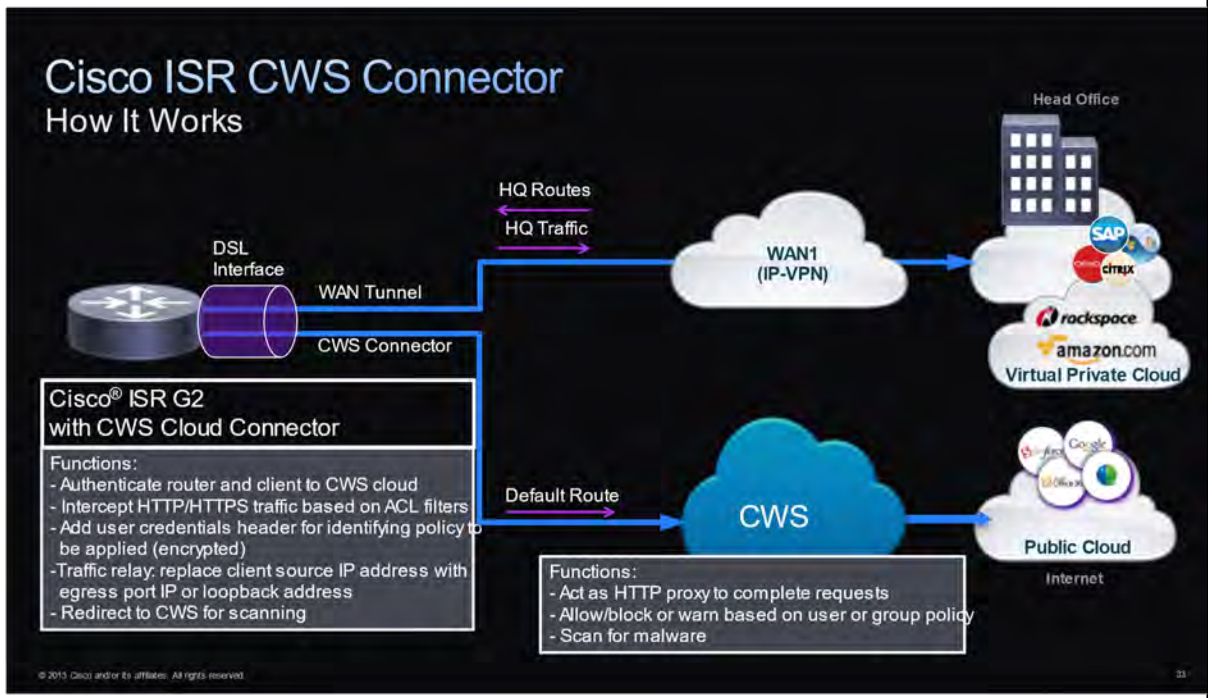
No.	’111 Patent Claim 2	Cisco IWAN System
		

No.	’111 Patent Claim 2	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 2[a] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Chua discloses programming network nodes with redirecting, mirroring, and blocking programmed actions. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific

No.	’111 Patent Claim 2	Cisco IWAN System
		traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header”) Chua at 28:7-32 (“In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data, forward packets of the packet flow to a destination of the packet flow, forward packets of malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.”)

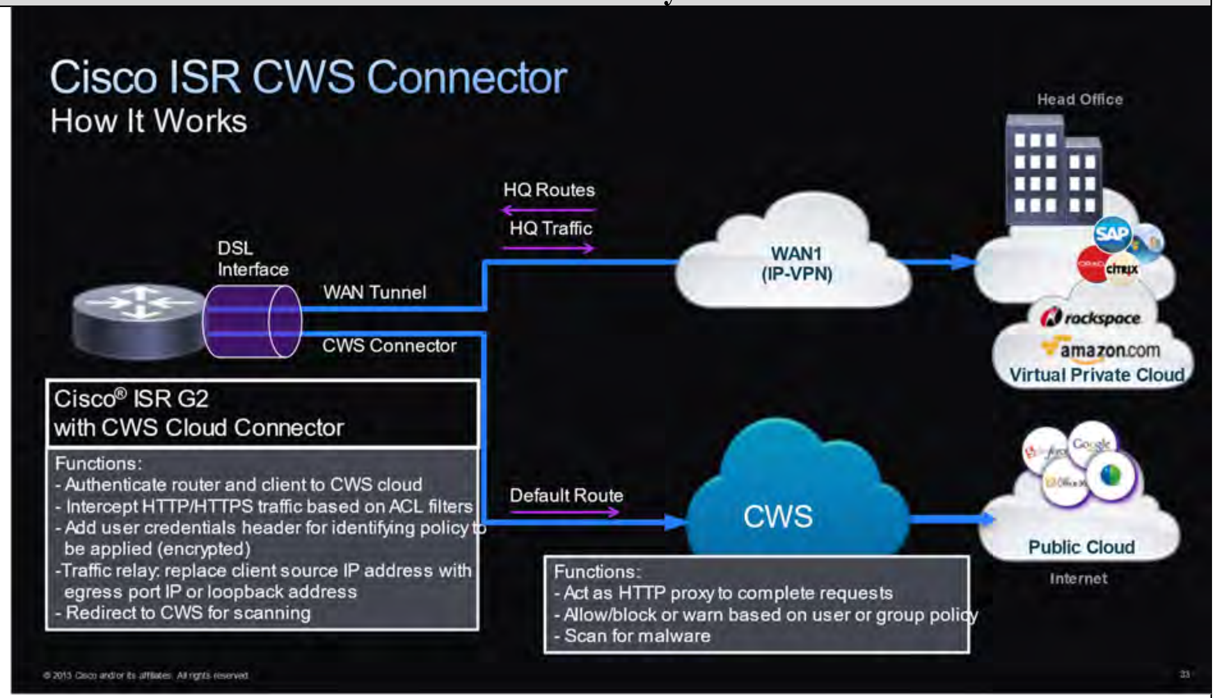
No.	’111 Patent Claim 2	Cisco IWAN System
		As another example, Copeland discloses probing, copying, and terminating rules configured on the network device. Copeland at [0057] (“In accordance with an aspect of the invention, a flow is considered terminated after a predetermined period of time has elapsed on a particular connection or port. For example, if HTTP Web traffic on port 80 ceases for a predetermined period of time, but other traffic begins to occur on port 80 after the expiration of that predetermined time period, it is considered that a new flow has begun, and the system responds accordingly to assign a new flow number and track the statistics and characteristics thereof. In the disclosed embodiment, the predetermined time period is 330 seconds, but those skilled in the art will understand that this time is arbitrary and may be heuristically adjusted.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0093] (“As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.”) Copeland at [0095] (“When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.”)

No.	’111 Patent Claim 2	Cisco IWAN System
		Copeland at [0099] (“As another example, if a particular host sends a large number of SYN packets to a target host and in response receives numerous R packets from the targeted host, a potential TCP probe is indicated. Likewise, numerous UDP packets sent from one host to a targeted host and numerous ICMP "port unavailable" packets received from the targeted host indicate a potential UDP probe. A stealth probe is indicated by multiple packets from the same source port number sent to different port numbers on a targeted host.”) Copeland at [0107] (“A flow is terminated if no communications occur between the two IP addresses and the one low port (e.g. port 80) for 330 seconds. Most Web browsers or a TCP connec-tion send a reset packet (i.e. a packet with the R flag set) if no communications are sent or received for 5 minutes. An analysis can determine if the flow is abnormal or not for HTTP communications.”) Copeland at [0123] (“Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.”) Copeland at [0145] (“A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.”) Copeland at [0158] (“Flow processing is done for TCP and UDP packets, and the port numbers in the transport layer header are used to identify the flow record to be updated. For ICMP packets that constitute rejections of a packet, the copy of the rejected packet in the ICMP data field is used to identify the IP addresses and port numbers of the corresponding flow.”)

No.	’111 Patent Claim 2	Cisco IWAN System
2[b]	upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller.	Cisco IWAN System discloses upon receiving by the network node the ‘terminate’ instruction, the method further comprising blocking, by the network node, the packet from being sent to the second entity and to the controller. For example, Cisco IWAN System discloses blocking or preventing the forwarding of traffic flows by the branch device/border router to the intended data center device or hub/master controller based on a particular traffic policy definition. Cisco IWAN 

No.	’111 Patent Claim 3	Cisco IWAN System
3[a]	The method according to claim 1, wherein the	Cisco IWAN System discloses the method according to claim 1, wherein the instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction.

No.	’111 Patent Claim 3	Cisco IWAN System
	instruction is a ‘probe’, a ‘mirror’, or a ‘terminate’ instruction, and	*See supra* at 2(a).
3[b]	upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the method further comprising sending the packet, by the network node, to the second entity and to the controller.	Cisco IWAN System discloses upon receiving by the network node the ‘mirror’ instruction and responsive to the packet satisfying the criterion, the 4[b]method further comprising sending the packet, by the network node, to the second entity and to the controller. For example, Cisco IWAN System discloses traffic policies sent by the hub/master controller to the branch devices/border routers, including forwarding policies. A person of ordinary skill in the art would understand that such traffic policies could include any number of definitions including a mirror instruction in which, responsive to determining a particular traffic class of the traffic flow, forwarding the traffic to the intended data center device as well as the hub/master controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, upon receiving by the network node the ‘mirror' instruction and responsive to the packet satisfying the criterion, method further comprising sending the packet, by the network node, to the second entity and to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN

No.	’111 Patent Claim 3	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 3[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Chua discloses a mirror program in response to an indication based on the packet header in which the network devices mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow. Chua at 7:28-54 (“SDN controller 112 may receive data as input from service devices 116. For example, SDN controller 112 may be con-figured to receive data from an intrusion detection system (IDS) device, a Denial of Service (DoS) device, a Distributed Denial of

No.	’111 Patent Claim 3	Cisco IWAN System
		Service (DDoS) device, an intrusion prevention system (IPS) device, or the like. Based on this information, SDN controller 112 may make network enforcement decisions for specific traffic flows. That is, SDN controller 112 may program network devices of SDN 106 to perform pro-grammed actions on packets of a packet flow based on this data. Such programmed actions may include: Allow-explicitly allow a certain network flow to proceed to its destination Block-explicitly block a certain flow from traversing SDN 106 Mirror-allow the traffic, but send a copy of the traffic for deeper inspection or recording to, e.g., one of service devices 116 Redirect-redirect the traffic to another network (such as a honeypot device or other device of service devices 116) for either inspection or to keep a potential hacker 'busy' to determine if there is a real security threat. Transform-modify or translate values of headers of packets in the network flow Encapsulate-encapsulate packets in the network flow with a particular header”) Chua at 16:23-44 (“More particularly, control unit 130 may configure any of service devices 116 to send data representative of a particular event to SDN controller 112, and control unit 130 may auto-matically reprogram one or more network devices of SDN 106 in response to such data. For example, security monitor-ing applications of service devices 116 may determine that a specific source port, destination port, source IP address, des-tination IP address, or the like should be acted upon. Alter-natively, security monitoring applications may determine that, due to content or deep packet inspection, a specific type of traffic is malicious and should be blocked. In either case, the corresponding one of service devices 116 may send a message to SDN controller 112 representative of these deter-minations. As yet another example, a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics. SDN controller 112 may respond by programming network devices of SDN 106 to perform a programmed action, such as allowing corresponding traffic, blocking corresponding traf-fic, mirroring corresponding traffic, redirecting correspond-ing traffic.”) Chua at 28:7-32 (“In addition, SDN controller 112 may configure the service device to send service-related data to one or more network devices (334). The service-related data may

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		cause the net-work devices to change a path along which the packet is forwarded. For example, when the service device is a security device (e.g., a firewall or an IDS), if the security device determines that one or more packets of a packet flow are malicious, the security device may send service data indicat-ing that the packet flow includes malicious data. SDN con-troller 112 may program the network devices of the SDN to perform a programmed action based on the service-related data (336). For example, SDN controller 112 may program network devices to, in response to an indication that packets of a packet flow include malicious data, forward packets of the packet flow to a destination of the packet flow, forward packets of malicious packet flows to a collection device for further analysis, cause network devices to drop packets of the malicious packet flows, send a close session message to devices from which packets of the malicious packet flows were received, block the packets of the packet flow, mirror copies of the packets of the packet flow to a second service device while forwarding the packets of the packet flow to the destination of the packet flow, redirect the packets of the packet flow to a third service device, transform one or more values of headers of the packets, and/or encapsulate the pack-ets with a particular header, or other such actions.”) As another example, Swenson discloses a counting mode instructed by the network controller to the steering device for monitoring and optimizing, in which the steering device forwards the packet flow to the user device/origin server and at the same time, sending the packet flow to the network controller. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”)

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		Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0064] (“Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify

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		the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net-work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at [0072] (“In one embodiment, if the video optimizer 150 failed to retrieve user requested video file from the origin server 160, the video optimizer 150 appends a "do not transcode" flag to the HTTP redirect request and returned to the user device 110, which re-sends the request out over the network to the origin server 160. The origin server 160 responds appropriately to the request by sending back video 624, which is intercepted by the steering device 130 only. The steering device 130 forwards the video to the user device 110

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		and at the same time reports the flow size to the network controller 140 for monitoring purpose.”)

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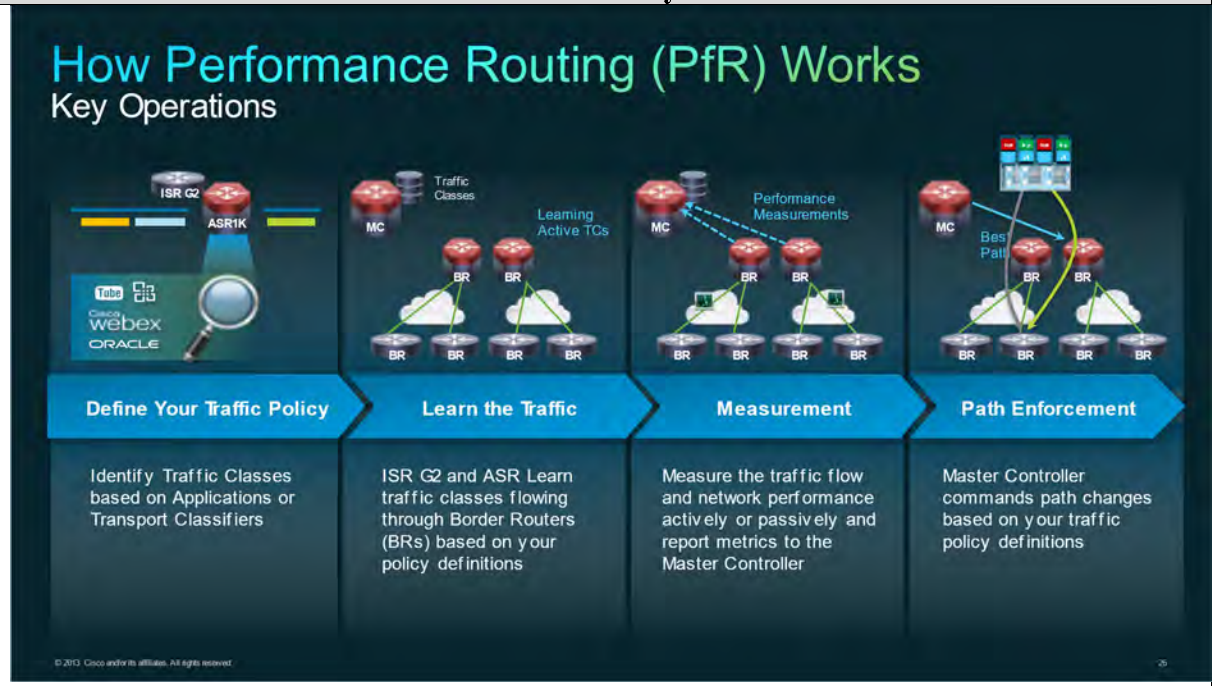
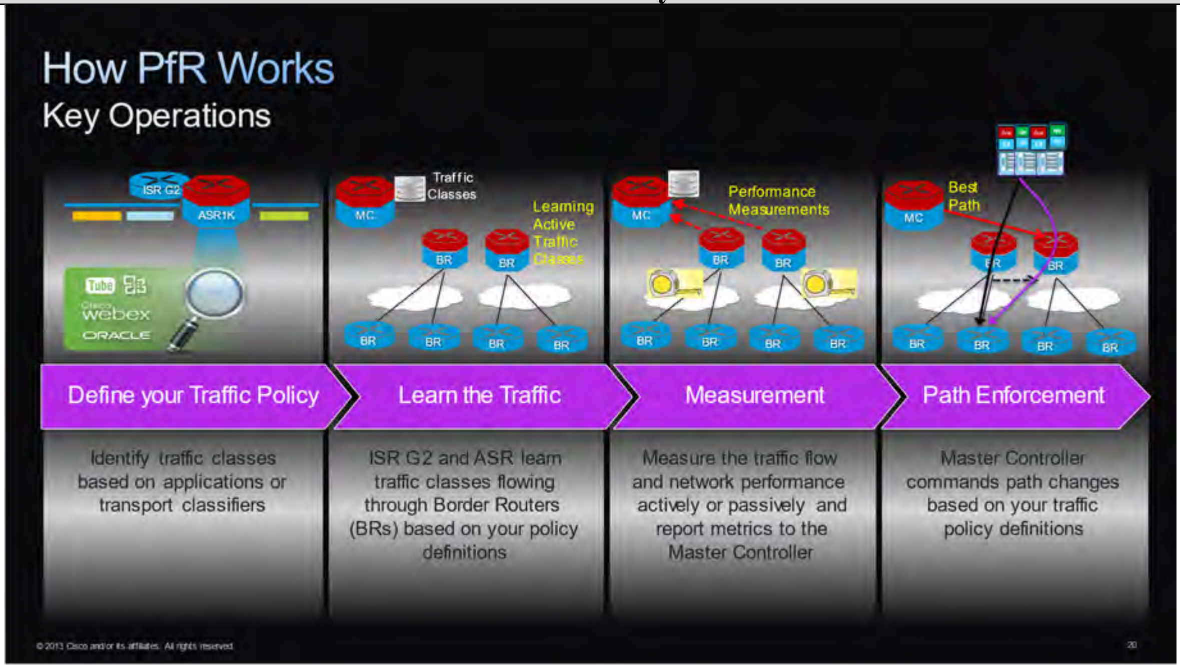
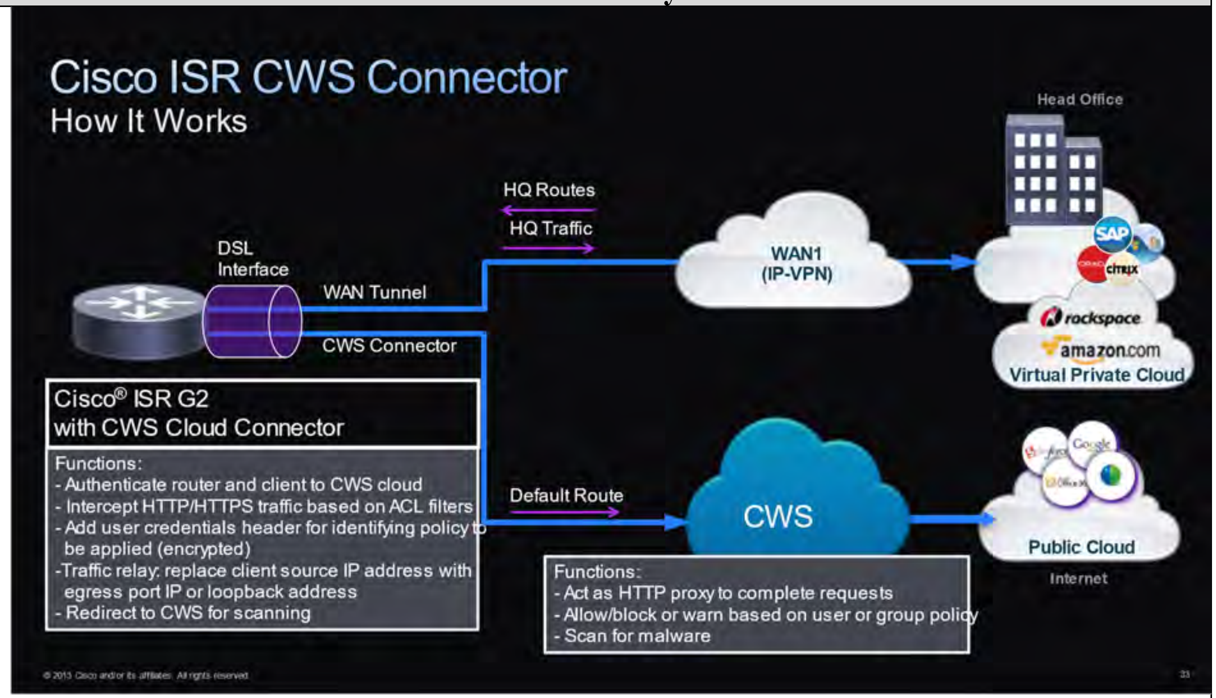
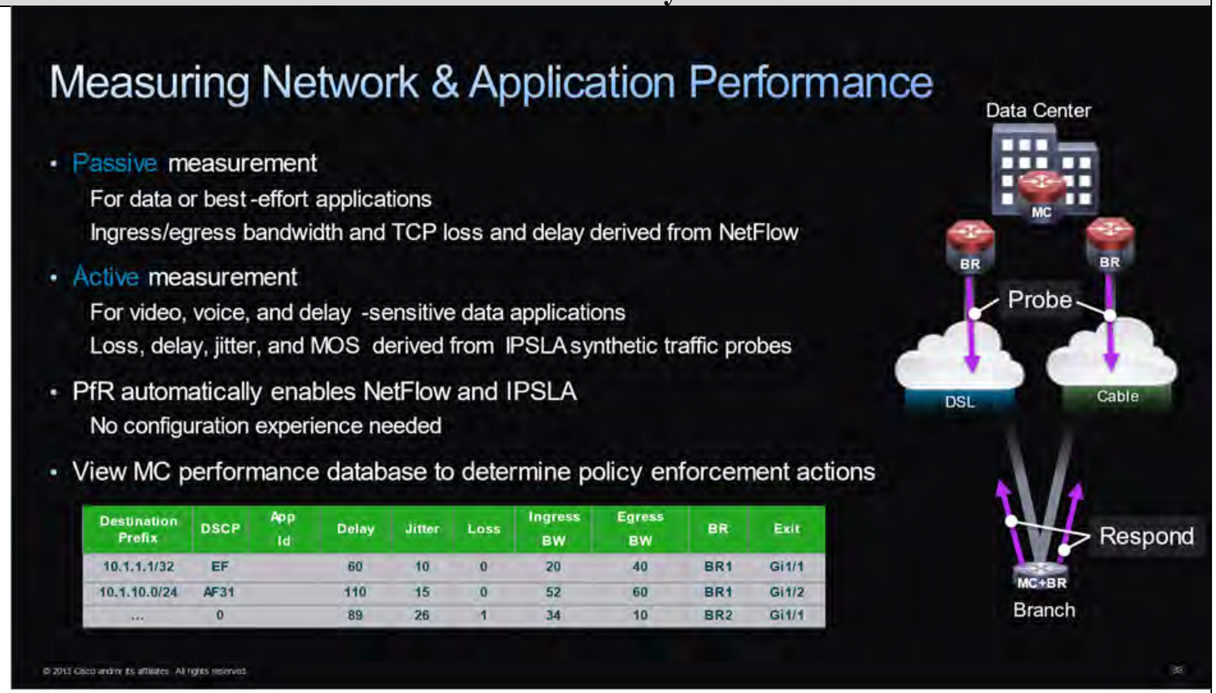
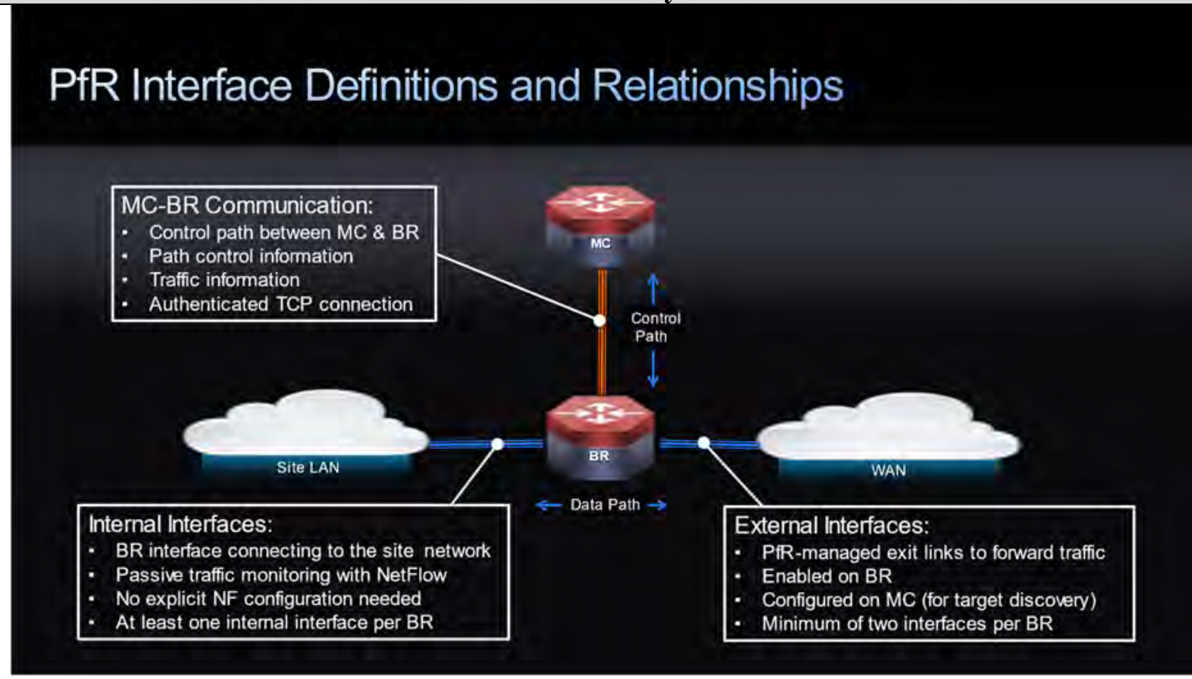
4[a]	The method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction, and	Cisco IWAN System discloses the method according to claim 1, wherein the instruction is ‘probe’, ‘mirror’, or ‘terminate’ instruction. *See supra* at 2(a).
4[b]	upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller;	Cisco IWAN System discloses upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller. For example, Cisco IWAN System discloses a probe policy enforced by the branch device/border router in which traffic flow metrics are sent to the hub/master controller upon determining the traffic belongs to a particular traffic class. A person of ordinary skill in the art would understand that such traffic policies could include any number of definitions in which, responsive to determining a particular traffic class of the traffic flow, forwards the traffic to the hub/master controller. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, upon receiving by the network node the ‘probe’ instruction and responsive to the packet satisfying the criterion, the method further comprising: sending the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. Cisco Next Generation

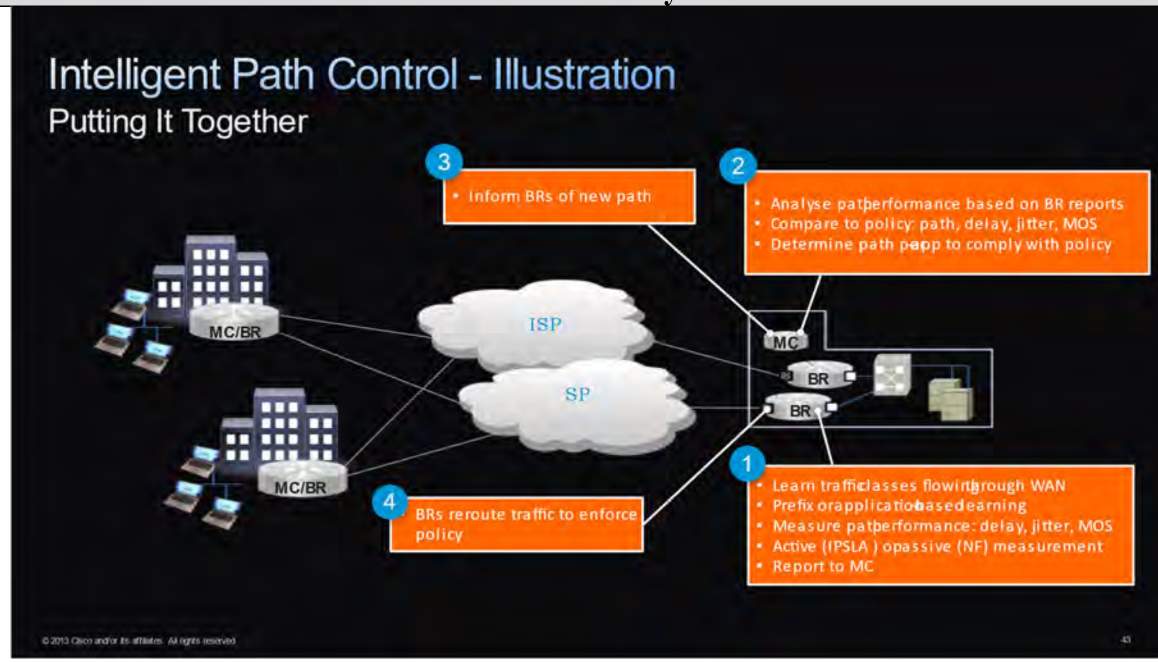
No.	’111 Patent Claim 4	Cisco IWAN System
		 Cisco IWAN

No.	'111 Patent Claim 4	Cisco IWAN System
		 Cisco IWAN

No.	'111 Patent Claim 4	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	'111 Patent Claim 4	Cisco IWAN System
		

No.	'111 Patent Claim 4	Cisco IWAN System
		

No.	’111 Patent Claim 4	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses sending the packet from the network element to the controller or another table, in response to the packet matching the action in the flow table. Kempf at [0044] (“FIG. 1 is a diagram of one embodiment of an example network with an OpenFlow switch, conforming to the OpenFlow 1.0 specification. The OpenFlow 1.0 protocol enables a controller 101 to connect to an OpenFlow 1.0 enabled switch 109 using a secure channel 103 and control a single forwarding table 107 in the switch 109. The controller 101 is an external software component executed by a remote computing device that enables a user to configure the Open-Flow 1.0 switch 109. The secure channel 103 can

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		be provided by any type of network including a local area network (LAN) or a wide area network (WAN), such as the Internet.”) Kempf at [0045] (“FIG. 2 is a diagram illustrating one embodiment of the contents of a flow table entry. The forwarding table 107 is populated with entries consisting of a rule 201 defining matches for fields in packet headers; an action 203 associated to the flow match; and a collection of statistics 205 on the flow. When an incoming packet is received a lookup for a matching rule is made in the flow table 107. If the incoming packet matches a particular rule, the associated action defined in that flow table entry is performed on the packet.”) Kempf at [0046] (“A rule 201 contains key fields from several headers in the protocol stack, for example source and destination Ethernet MAC addresses, source and destination IP addresses, IP protocol type number, incoming and outgoing TCP or UDP port numbers. To define a flow, all the available matching fields may be used. But it is also possible to restrict the matching rule to a subset of the available fields by using wildcards for the unwanted fields.”) Kempf at [0047] (“The actions that are defined by the specification of OpenFlow 1.0 are Drop, which drops the matching packets; Forward, which forwards the packet to one or all outgoing ports, the incoming physical port itself, the controller via the secure channel, or the local networking stack (if it exists). OpenFlow 1.0 protocol data units (PDU s) are defined with a set of structures specified using the C programming language. Some of the more commonly used messages are: report switch configuration message; modify state messages (in-cluding a modify flow entry message and port modification message); read state messages, where while the system is running, the datapath may be queried about its current state using this message; and send packet message, which is used when the controller wishes to send a packet out through the datapath.”) Kempf at [0050] (“FIG. 4 illustrates one embodiment of the processing of packets through an OpenFlow 1.1 switched packet pro-cessing pipeline. A received packet is compared against each of the flow tables 401. After each flow table match, the actions are accumulated into an action set. If processing requires matching against another flow table, the actions in the matched rule include an action directing processing to the next table in the

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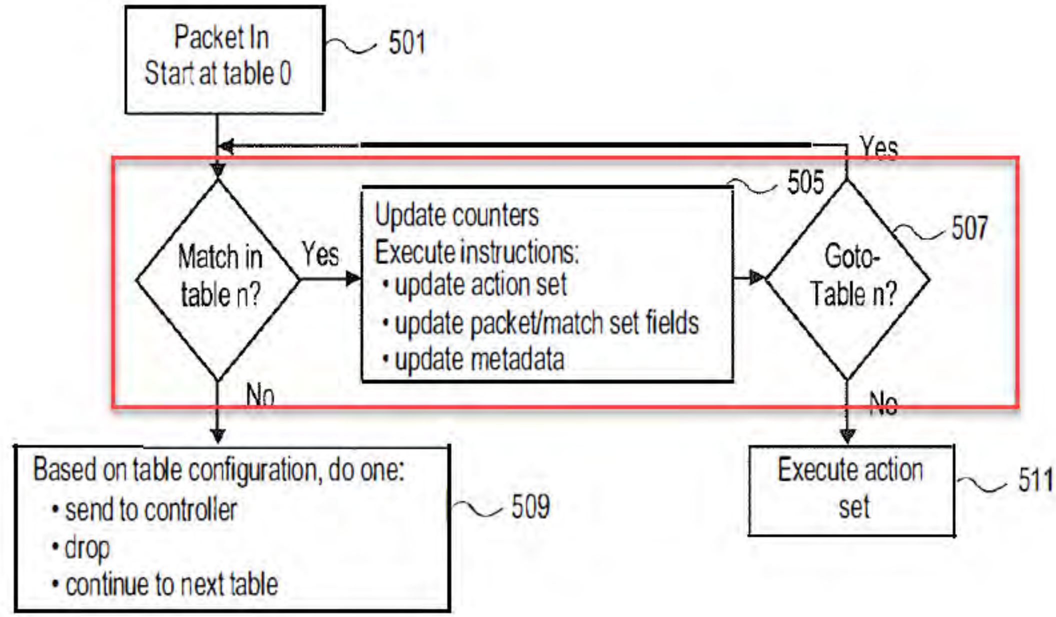
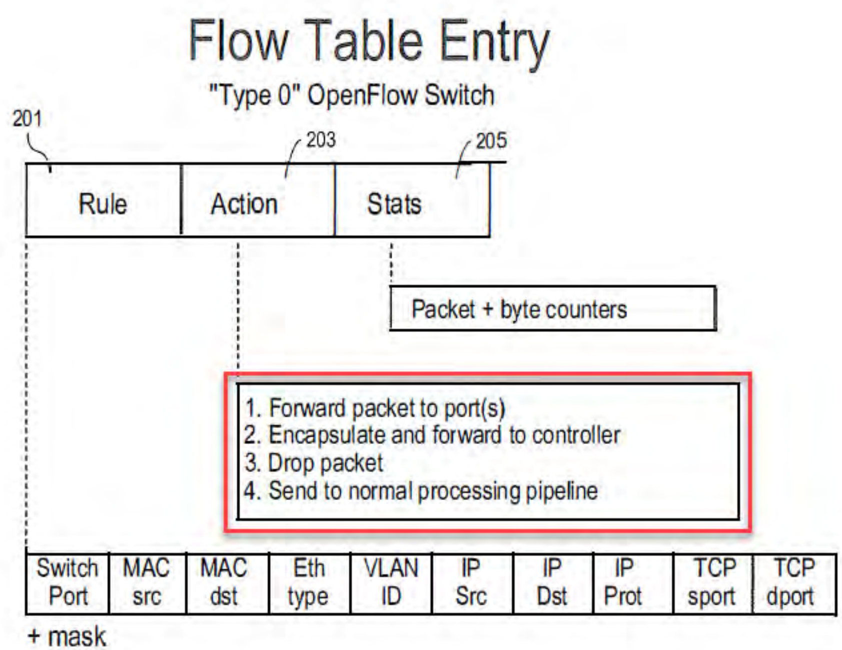
		pipeline. Absent the inclusion of an action in the set to execute all accumulated actions immediately, the actions are executed at the end 403 of the packet processing pipeline. An action allows the writing of data to a metadata register, which is carried along in the packet processing pipe-line like the packet header.") Kempf at [0091] ("When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.") Kempf at [0106] ("This encapsulates the packet and sends it to the OpenFlow controller.") Kempf at Figure 5 (annotation added)

No.	’111 Patent Claim 4	Cisco IWAN System
		 FIG. 5 Kempf at Figure 2 (annotation added)

No.	'111 Patent Claim 4	Cisco IWAN System
		 FIG. 2 For example, Swenson discloses determining by the steering device monitors flows that match one or more signatures or criteria of the packet. Swenson further discloses that when a matching flow is detected the steering device forwards the packet to the network controller. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further

No.	’111 Patent Claim 4	Cisco IWAN System
		inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The

No.	’111 Patent Claim 4	Cisco IWAN System
		network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of"reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0045] (“The steering device interface 316 interacts with an external routing appliance, such as the steering device 130 to divert portions of the network traffic (e.g., large object net-work flows). Existing routing appliances in most carrier net-works are designed to handle large amounts of network traf-fic. They are not, however, ideal devices to operate for monitoring and analysis individual flows. Through the steer-ing device interface 316, the network controller 140 may communicate with the external routing appliances, such as the steering device 130, to steer a portion of network traffic to the

No.	’111 Patent Claim 4	Cisco IWAN System
		network controller 140 when certain conditions are met. Generally, network flows of interest to the network controller 140 contain larger media objects, such as videos and images. In one embodiment, the smaller flows, such as web page and text information, are not exchanged over the steering device interface 316.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user

No.	’111 Patent Claim 4	Cisco IWAN System
		device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”)

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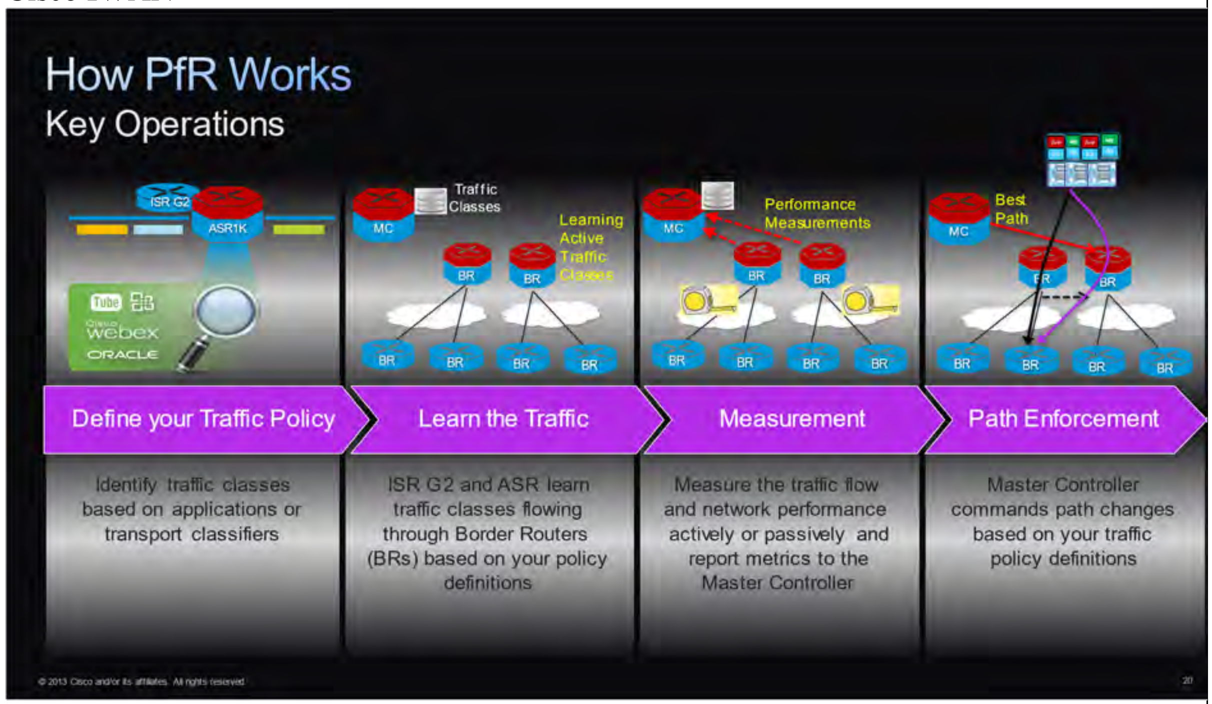
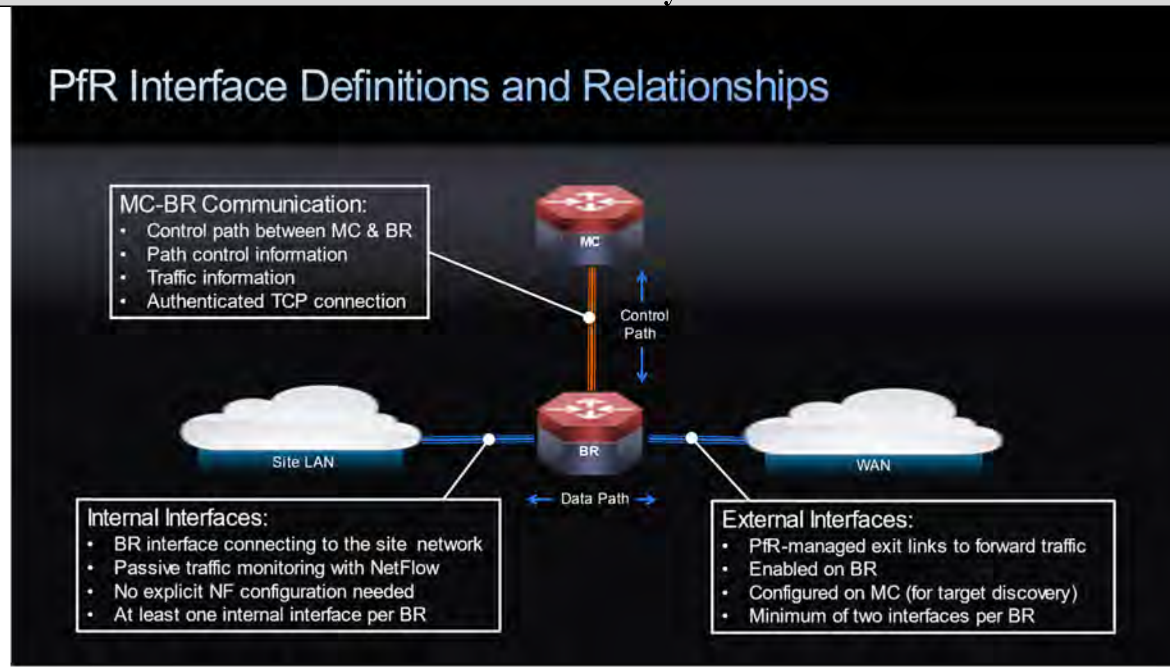
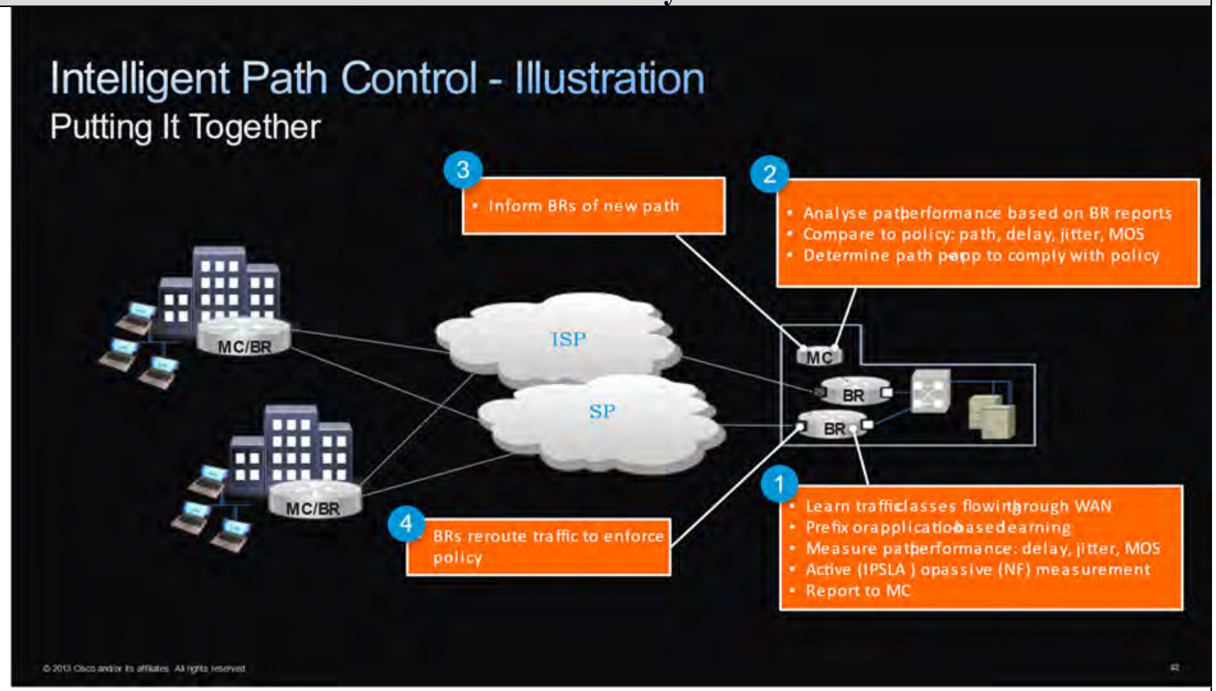
4[c]	responsive to receiving the packet, analyzing the packet, by the controller;	Cisco IWAN System discloses responsive to receiving the packet, analyzing the packet, by the controller. For example, Cisco IWAN System discloses analyzing traffic flow metrics received by the hub/master controller to update and change traffic policy definitions. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, responsive to receiving the packet, analyzing the packet, by the controller would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN  Cisco IWAN - Uncompromised Experience

No.	'111 Patent Claim 4	Cisco IWAN System
		

No.	’111 Patent Claim 4	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4(c) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further

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		inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The

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		network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of "reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example,

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		the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of

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		interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.") Swenson at [0065] ("FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.") Swenson at [0069] ("FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this

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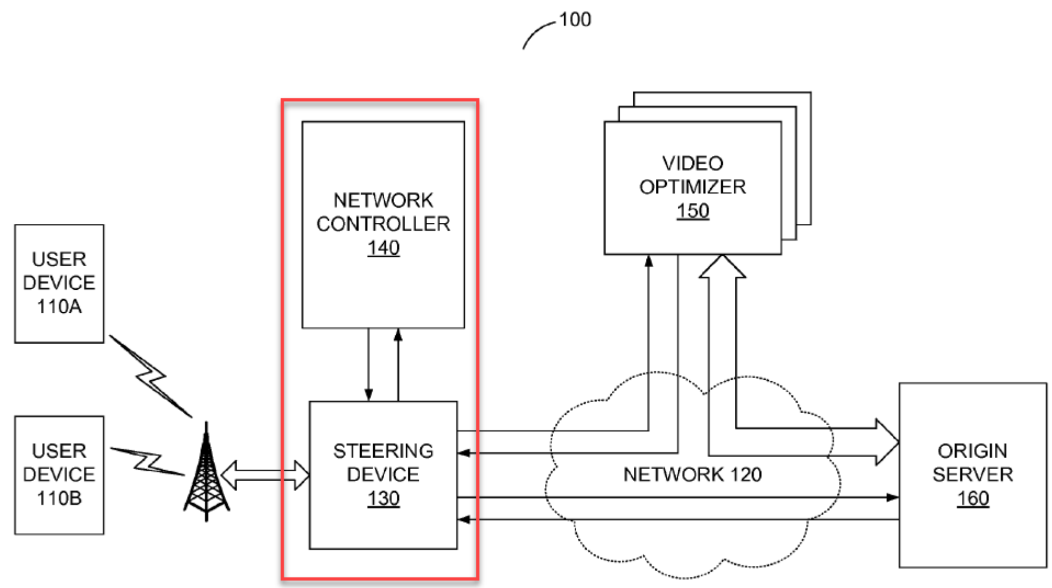
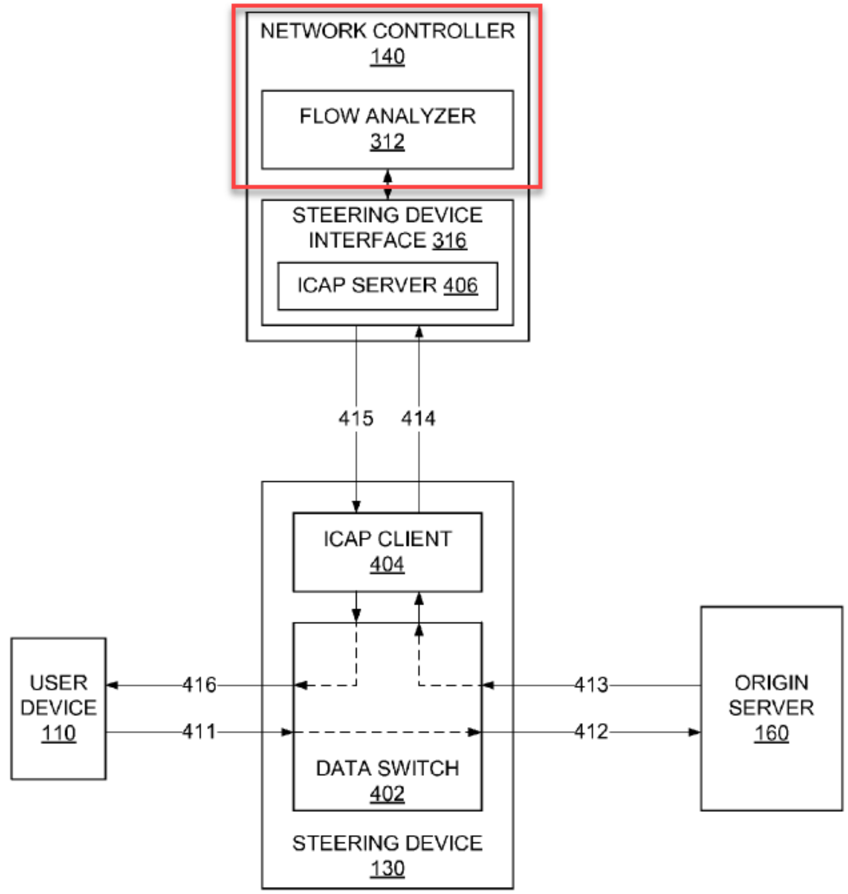
		case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)

No.	'111 Patent Claim 4	Cisco IWAN System
		 FIG. 1 Swenson at Figure 4A (annotation added)

No.	'111 Patent Claim 4	Cisco IWAN System
		 **FIG. 4A** For example, Copeland discloses analyzing packets received by the intrusion detection engine on the monitoring appliance.

No.	'111 Patent Claim 4	Cisco IWAN System
		Copeland at [0021] ("The present invention provides an accurate and reliable method for detecting network attacks through the use of sampled packet headers that are provided by a source such as that as defined in sFlow and further based in large part on "flows" as opposed to signatures or anomalies. By utilizing the host and flow information structures that are inherent with flow-based analysis and applying rules of statistical significance and analysis, the intrusion detection system can operate with sampled data such as provided by sFlow in order to provide a hybrid solution that combines many of the benefits of a packet capture implementation with the distributed nature of an IDS that operates on Netflow, thus providing an enhanced wide-area IDS solu-tion.") Copeland at [0023] ("According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.") Copeland at [0024] ("Generally speaking, the intrusion detection system analyzes network communication traffic for potential detrimental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.") Copeland at [0027] ("According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are

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		collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.") Copeland at [0028] ("Generally speaking, the intrusion detection system analyzes network communication traffic for potential detri-mental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.") Copeland at [0063] ("Consequently, abnormal flows and/or events iden-tified by the intrusion detection engine 155 will raise the concern index (CI) for the associated host. The intrusion detection engine 155 analyzes the data flow between IP devices. However, different types of services have different flow characteristics associated with that service. Therefore, a C/S flow can be determined by the packets exchanged between the two hosts dealing with the same service.") Copeland at [0065] ("The intrusion detection engine 155 analyzes the flow data 160 to determine if the flow appears to be legitimate traffic or possible suspicious activity. Flows with suspicious activity are assigned a predetermined concern index (CI) value based upon a heuristically predetermined assessment of the significance of the threat of the particular traffic or flow or suspicious activity. The flow concern index values have been derived heuristically from extensive net-work traffic analysis. Concern index values are associated with particular hosts and stored in the host data structure 166 (FIG. 1). Exemplary concern

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		index values for various exemplary flow-based events and other types of events are illustrated in connection with FIGS. 6 and 7.) Copeland at [0069] (“It will now be appreciated that the disclosed meth-odology of intrusion detection is accomplished at least in part by analyzing communication flows to determine if such communications have the flow characteristics of probes or attacks. By analyzing communications for abnormal flow characteristics, attacks can be determined without the need for resource-intensive packet data analysis. A flow can be determined from the packets 101 that are transmitted between two hosts utilizing a single service. The addresses and port numbers of communications are easily discerned by analysis of the header information in a datagram.”) Copeland at [0087] (“As previously stated, the flow-based engine 155 does not analyze the data segments of packets for signature identification. Instead, the engine 155 associates all packets with a flow. It analyzes certain statistical data and assigns a concern index value to abnormal activity. The engine 155 builds a concern index for suspicious hosts by detecting suspicious activities on the network. An alarm is generated when those hosts build enough concern (in the form of a cumulated CI value) to cross the network administrator's predetermined threshold.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0111] (“As shown, the packets exchanged between two hosts associated with a single service can determine a flow. A port number designates a service application that is associated with the particular port. Communications utiliz-ing differing protocols or services

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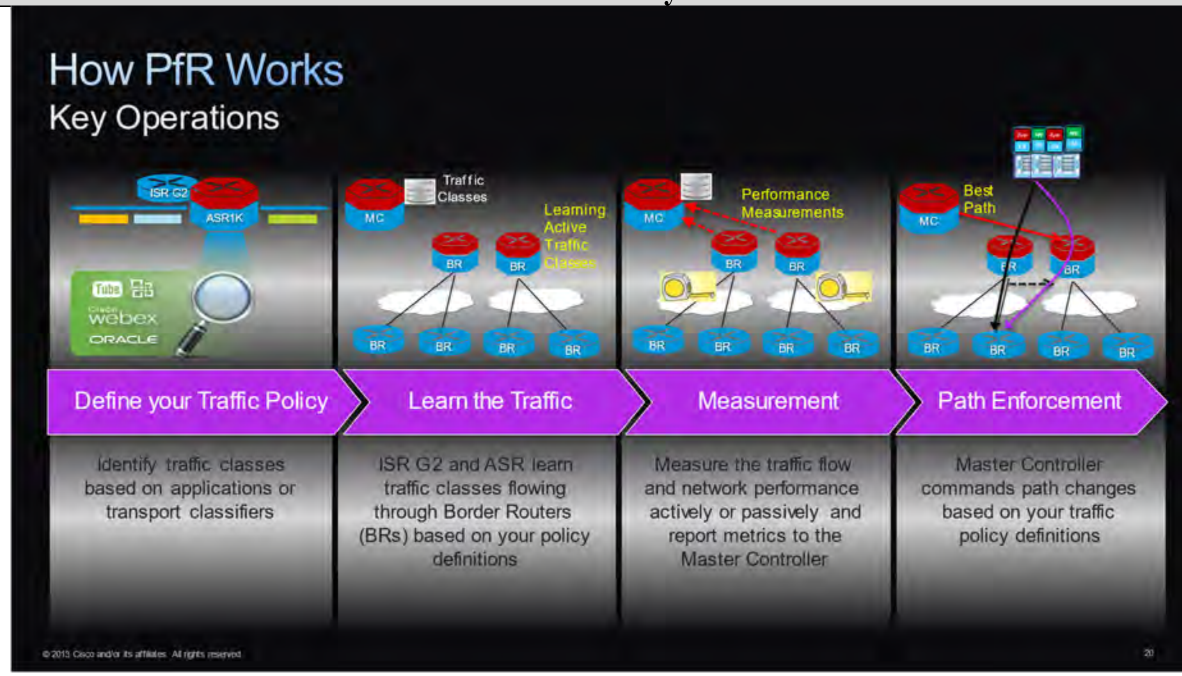
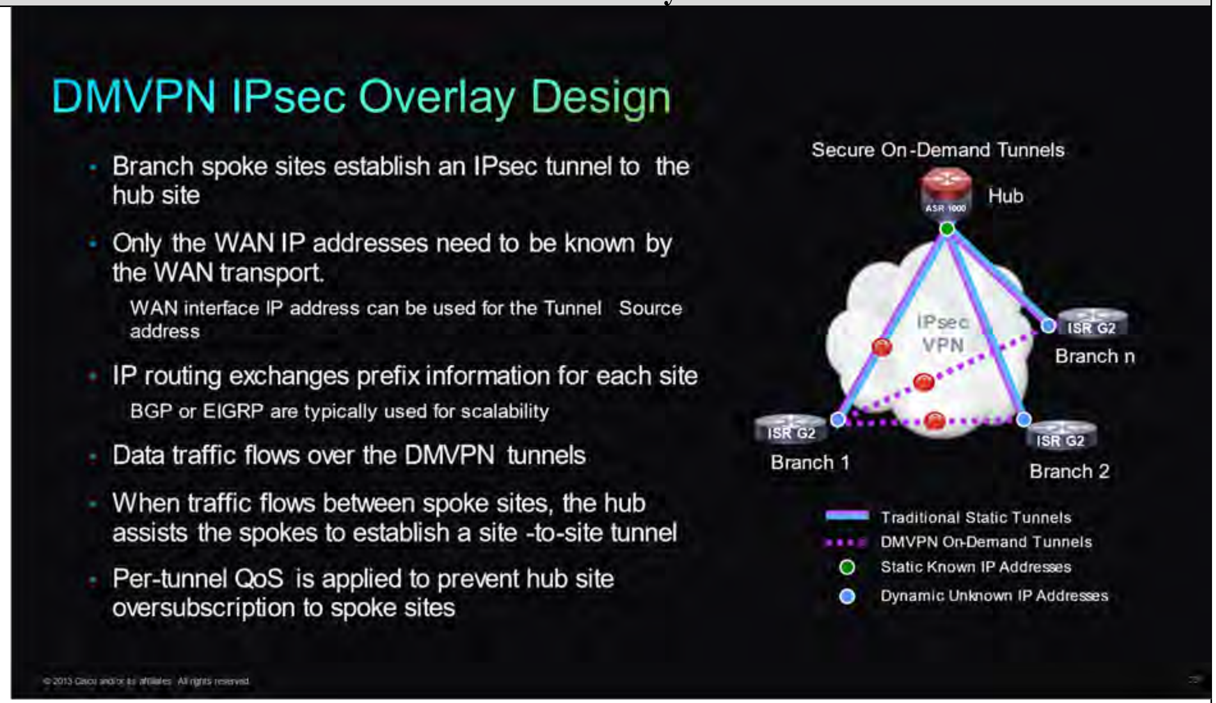
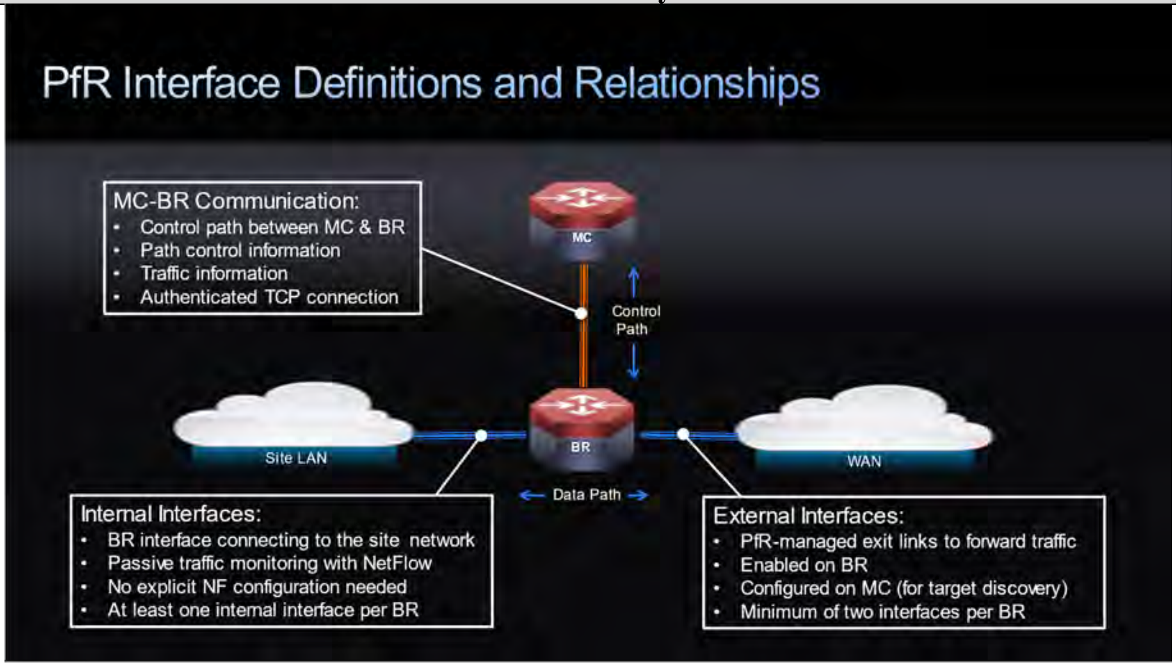
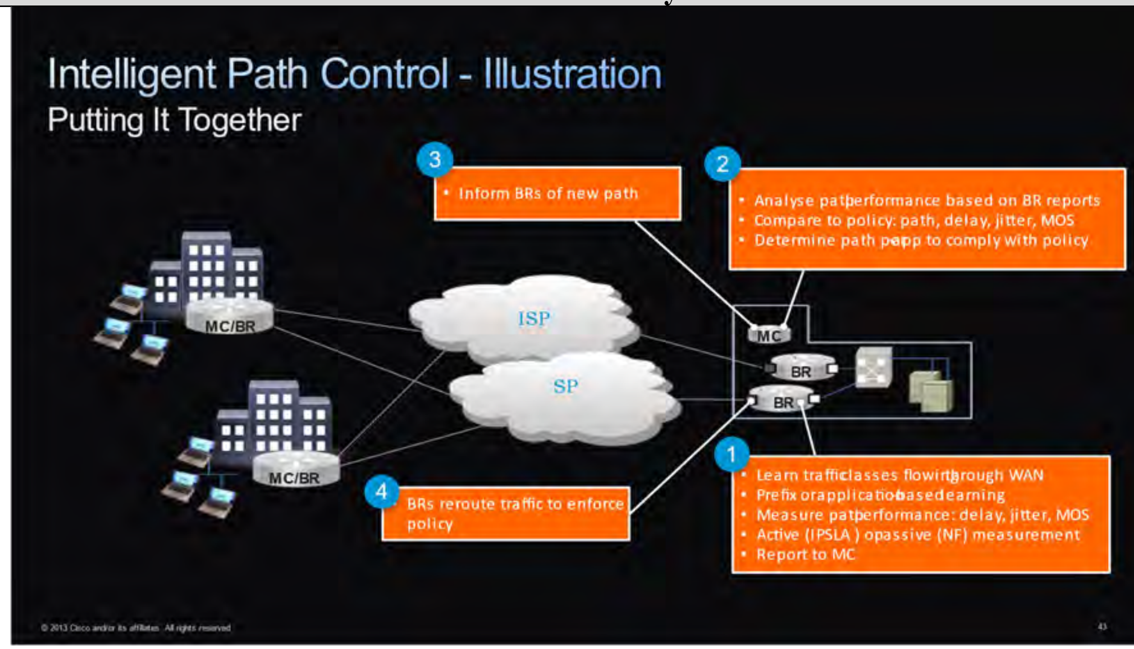
		provide differing flow characteristics. Consequently, the flow engine 155 analyzes each of the services separately.”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”)
4[d]	sending the packet, by the controller, to the network node; and	Cisco IWAN System discloses sending the packet, by the controller, to the network node. For example, Cisco IWAN System discloses sending updated traffic policies with traffic flow metrics to the branch devices/border routers. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, sending the packet, by the controller, to the network node would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN

No.	’111 Patent Claim 4	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	'111 Patent Claim 4	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	'111 Patent Claim 4	Cisco IWAN System
		

No.	’111 Patent Claim 4	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 4(d) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses sending the packet, for example a video or image, back to the steering device after the network controller analyzes the packet and updates flow statistics. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140

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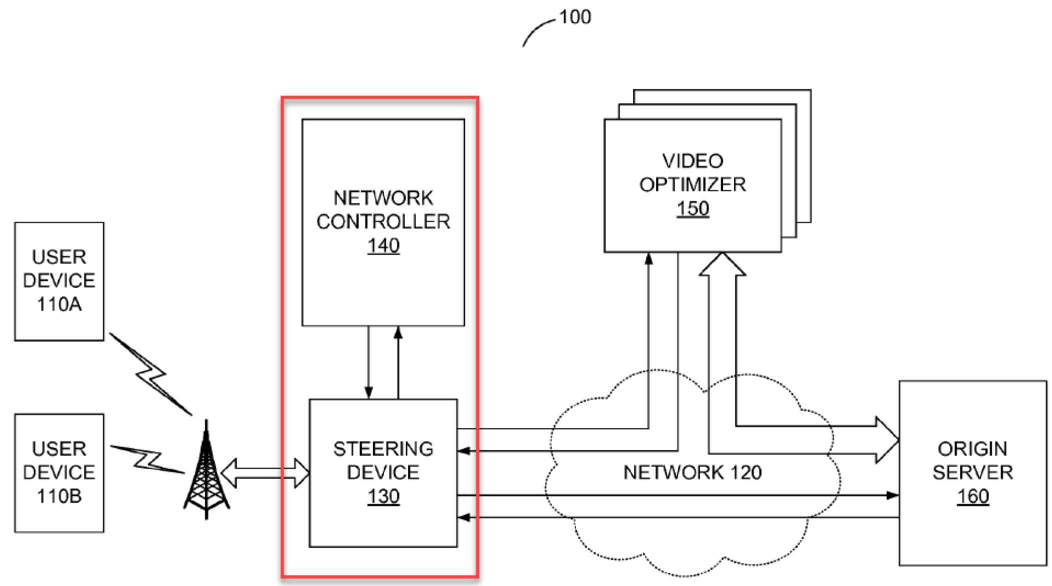
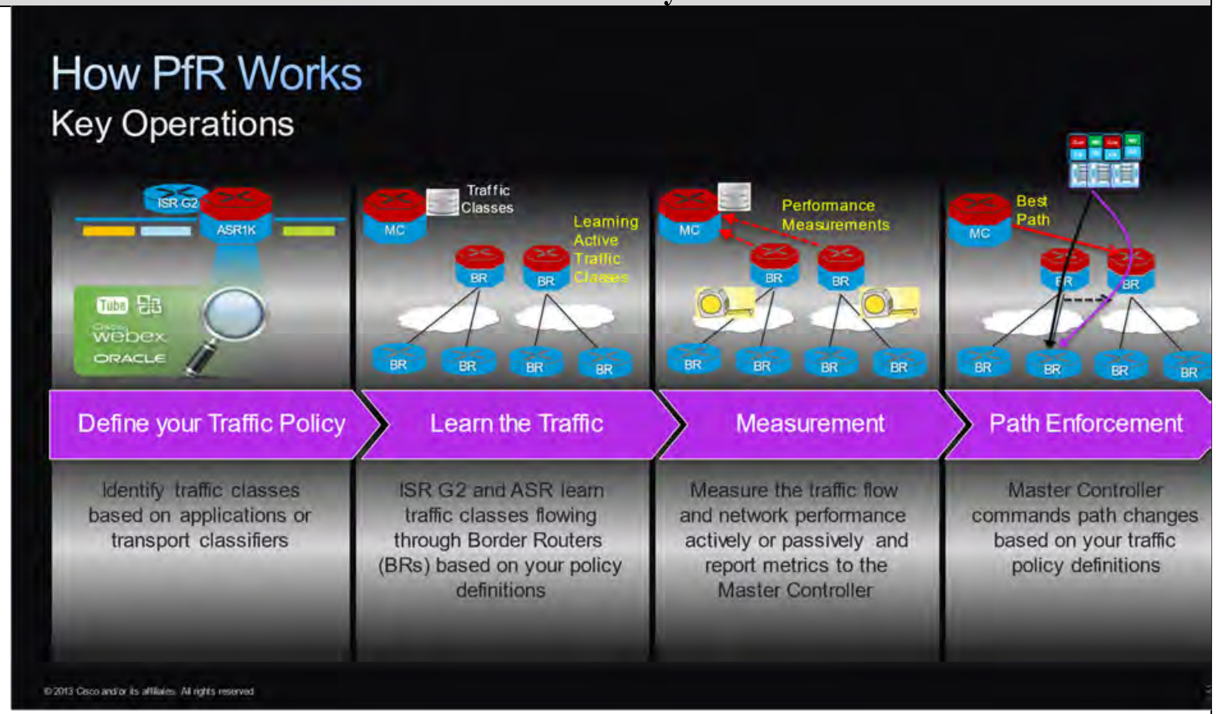
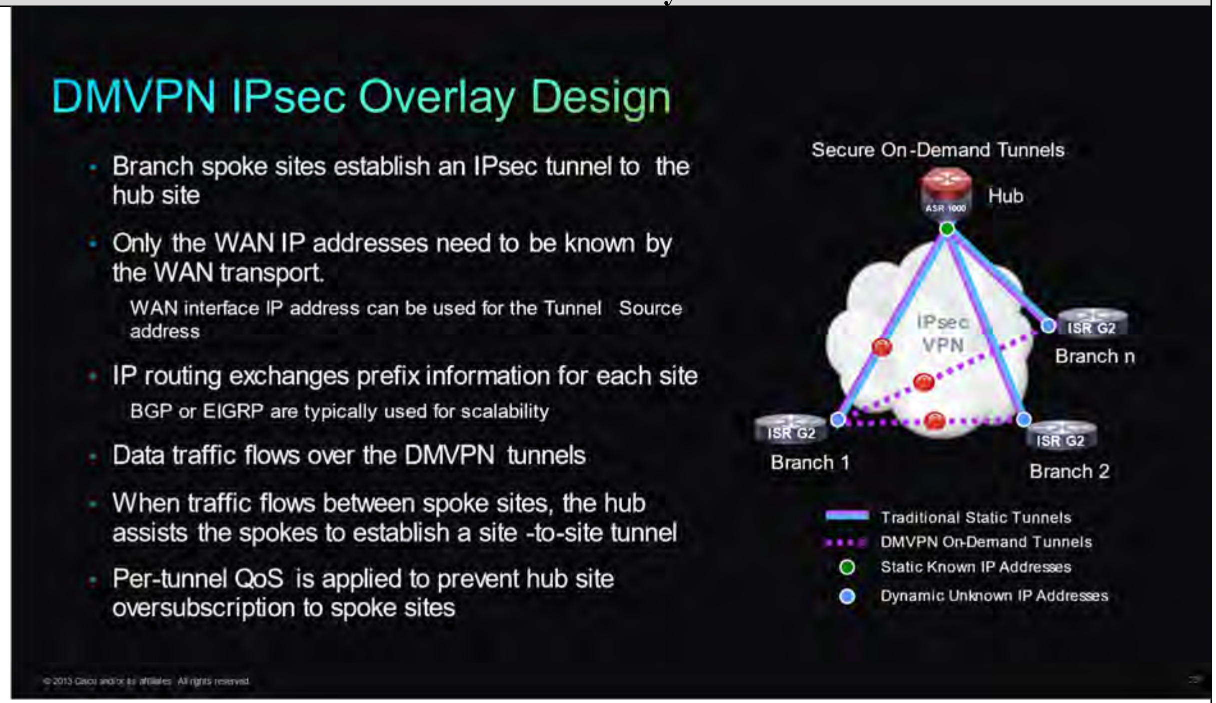
		interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0028] ("In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.") Swenson at [0029] ("As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The

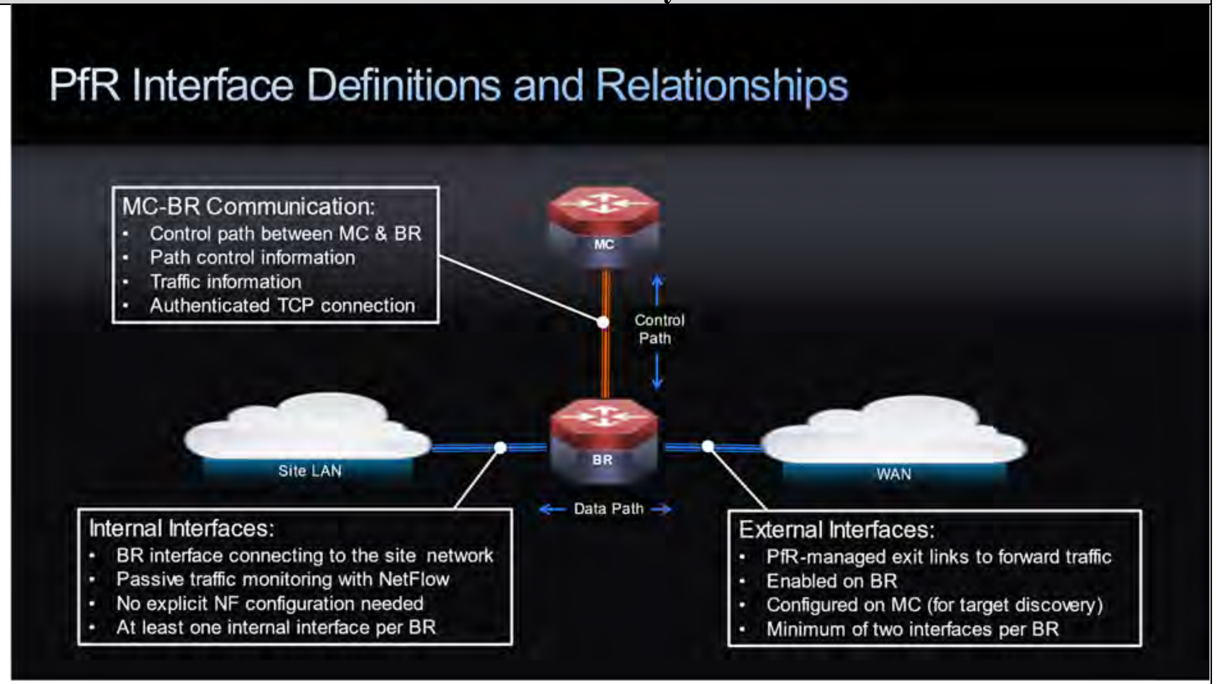
No.	'111 Patent Claim 4	Cisco IWAN System
		network controller 140 can then estimate the amount ofbandwidth or degree of congestion for the new flow based on the historical record.") Swenson at [0057] ("The Internet content adaption protocol is a light-weight protocol aimed at executing a simple remote proce-dure call on HTTP messages. ICAP leverages edge-based devices to help deliver value-added services using transparent HTTP proxy caches. Content adaptation refers to performing the particular value added service, such as content manipula-tion or other processing, for the associated HTTP client request/response. ICAP clients pass HTTP messages to ICAP servers for transformation or other processing. In tum, the ICAP server executes its transformation service on the HTTP messages and sends back responses to the ICAP client. At the core of this process is a cache that can proxy all client trans-actions and process them through ICAP servers, which may focus on specific functions, such as ad insertion, virus scan-ning, content translation, language translation, or content fil-tering. ICAP servers, such as those utilized by the network controller 140, handle these tasks to off-load value-added services from network devices including an ICAP client, such as the steering device 130. By offloading value added services from the steering device 130, processing infrastructure (e.g., optimization services and network controllers) may be scaled independent from the steering devices handling raw HTTP throughput.") Swenson at [0059] ("In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example, the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.") Swenson at [0060] ("If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working

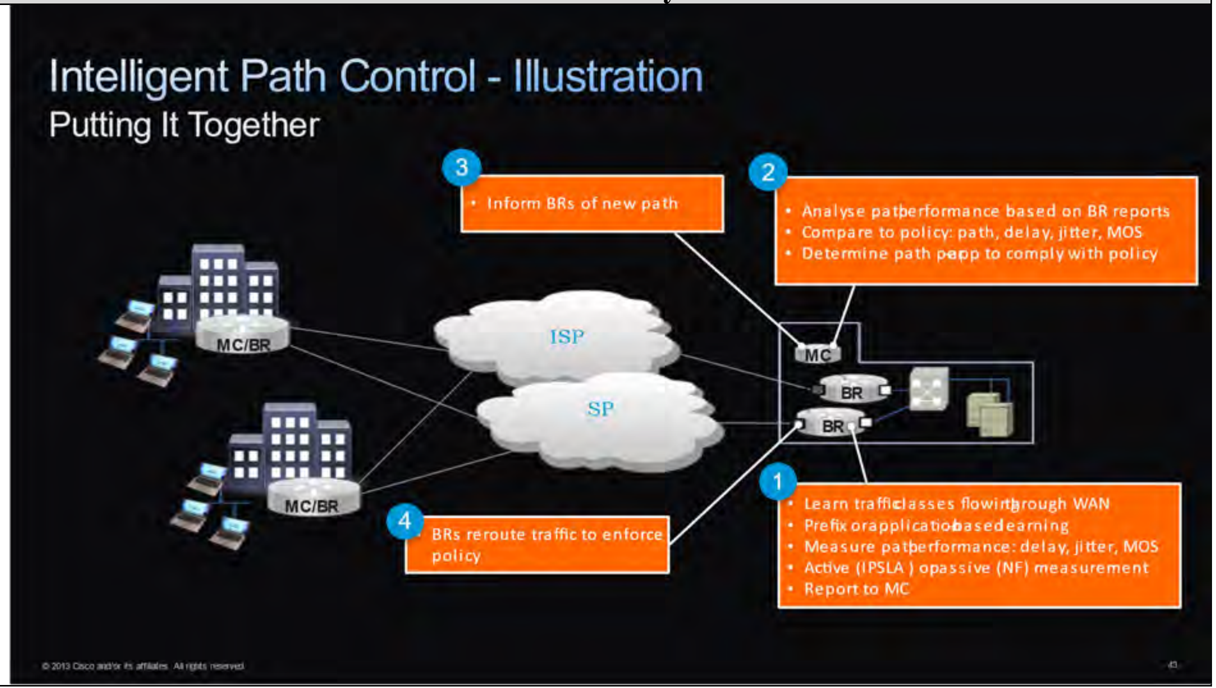
No.	'111 Patent Claim 4	Cisco IWAN System
		mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.") Swenson at [0071] ("After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.") Swenson at Figure 1 (annotation added)

No.	’111 Patent Claim 4	Cisco IWAN System
		 FIG. 1
4[e]	responsive to receiving the packet, sending the packet, by the network node, to the second entity.	Cisco IWAN System discloses responsive to receiving the packet, sending the packet, by the network node, to the second entity. For example, Cisco IWAN System discloses upon receiving updated traffic policies, sending the traffic to the intended data center device. Cisco IWAN

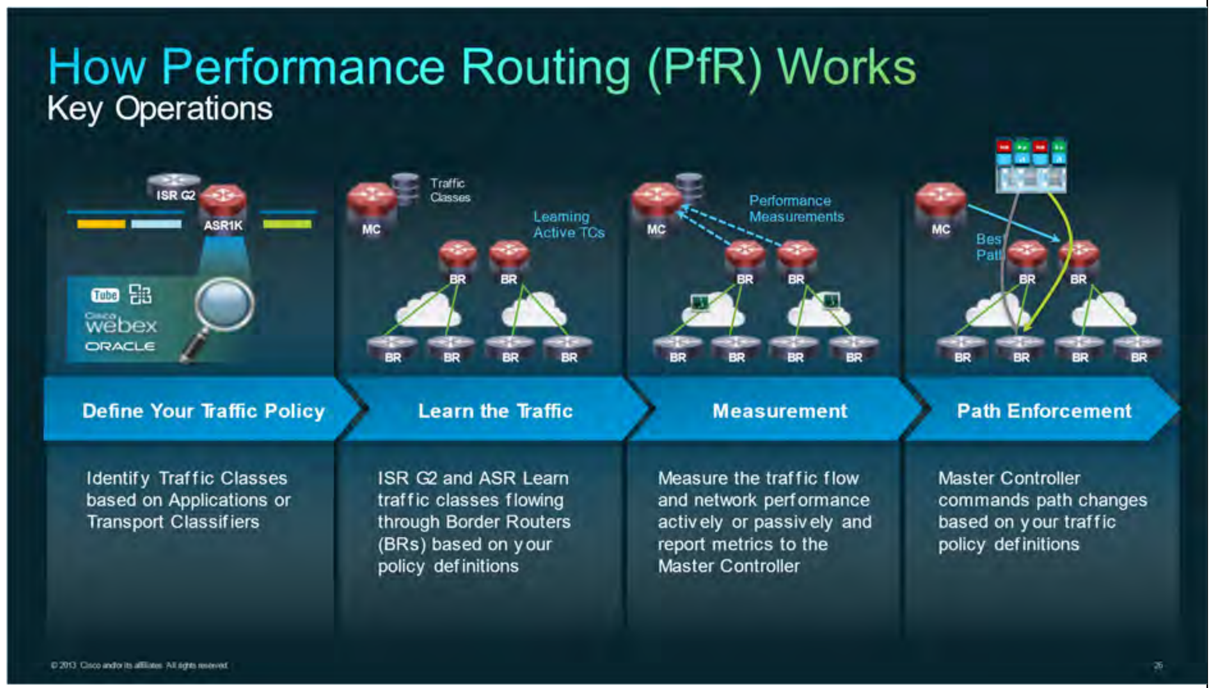
No.	’111 Patent Claim 4	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

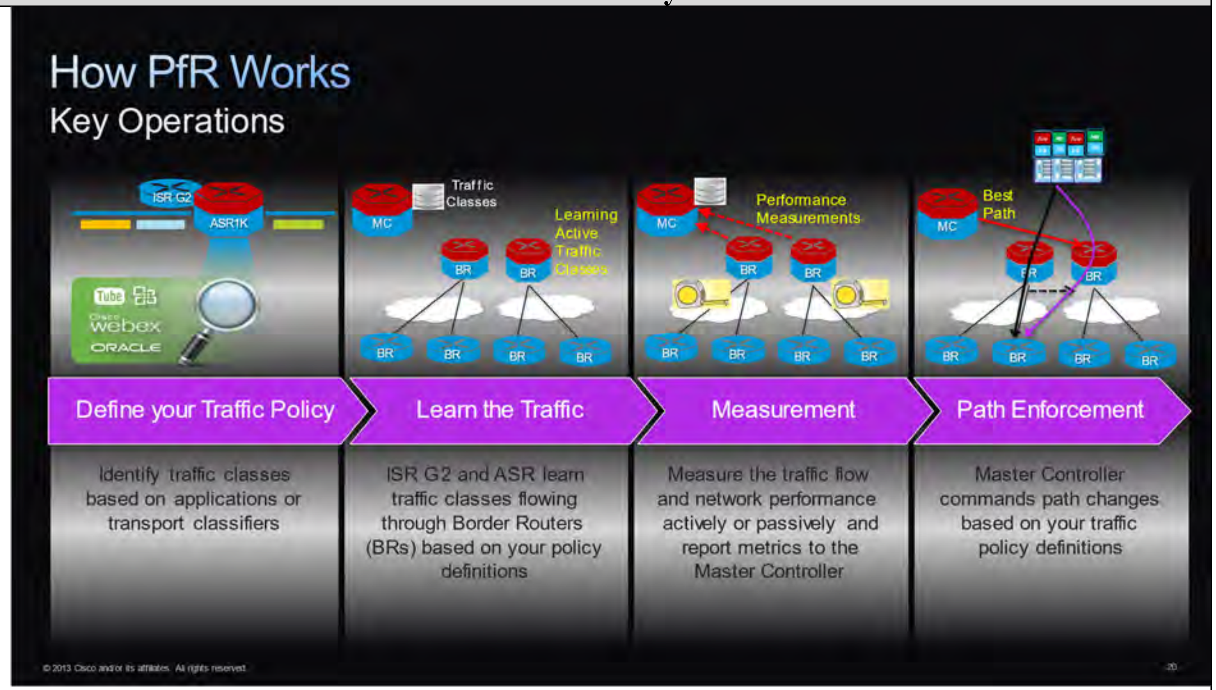
No.	’111 Patent Claim 4	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

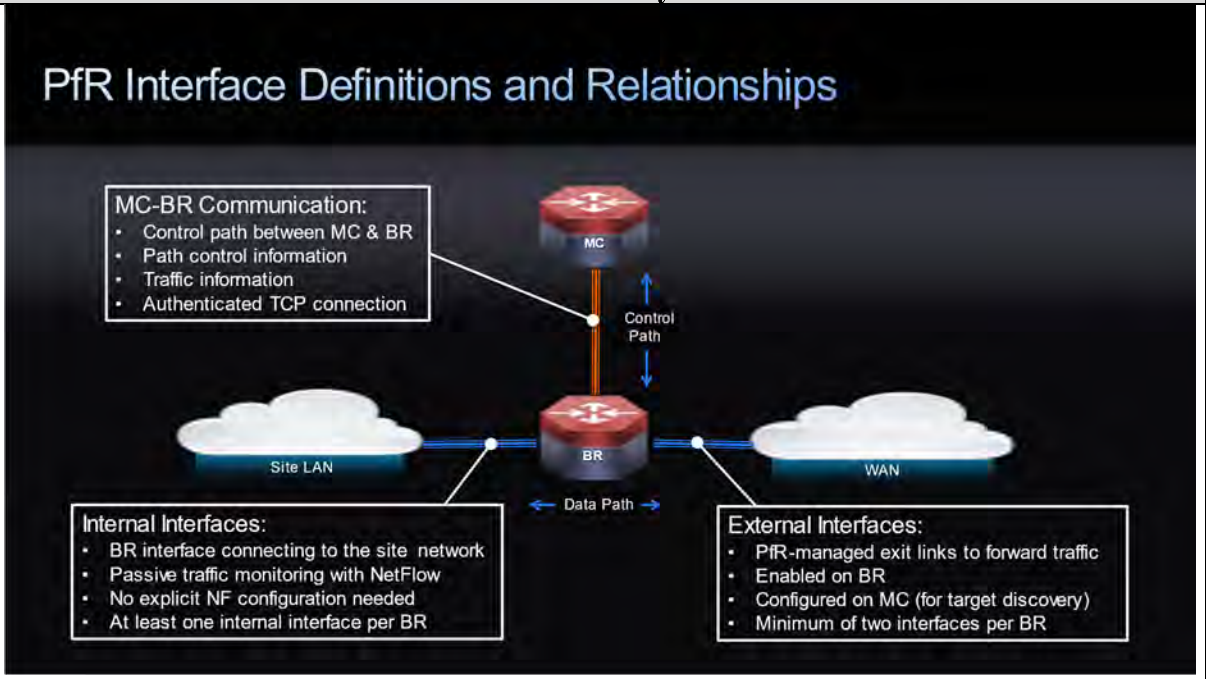
No.	'111 Patent Claim 4	Cisco IWAN System
		

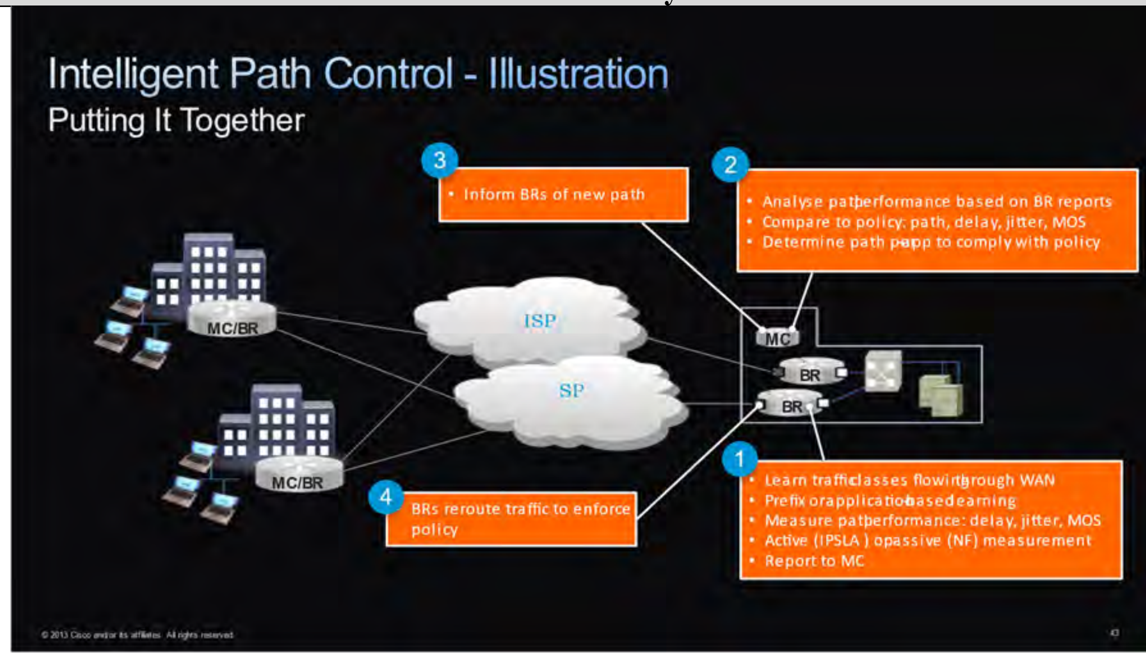
No.	’111 Patent Claim 4	Cisco IWAN System
		

No.	’111 Patent Claim 5	Cisco IWAN System
5	The method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller.	Cisco IWAN System discloses the method according to claim 1, further comprising responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller. For example, Cisco IWAN System discloses sending traffic flow metrics to the hub/master controller upon determining the traffic belongs to a particular traffic class. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, responsive to the packet satisfying the criterion and to the instruction, sending the packet or a portion thereof, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 1.

No.	’111 Patent Claim 5	Cisco IWAN System
		Cisco Next Generation  Cisco IWAN

No.	’111 Patent Claim 5	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	'111 Patent Claim 5	Cisco IWAN System
		

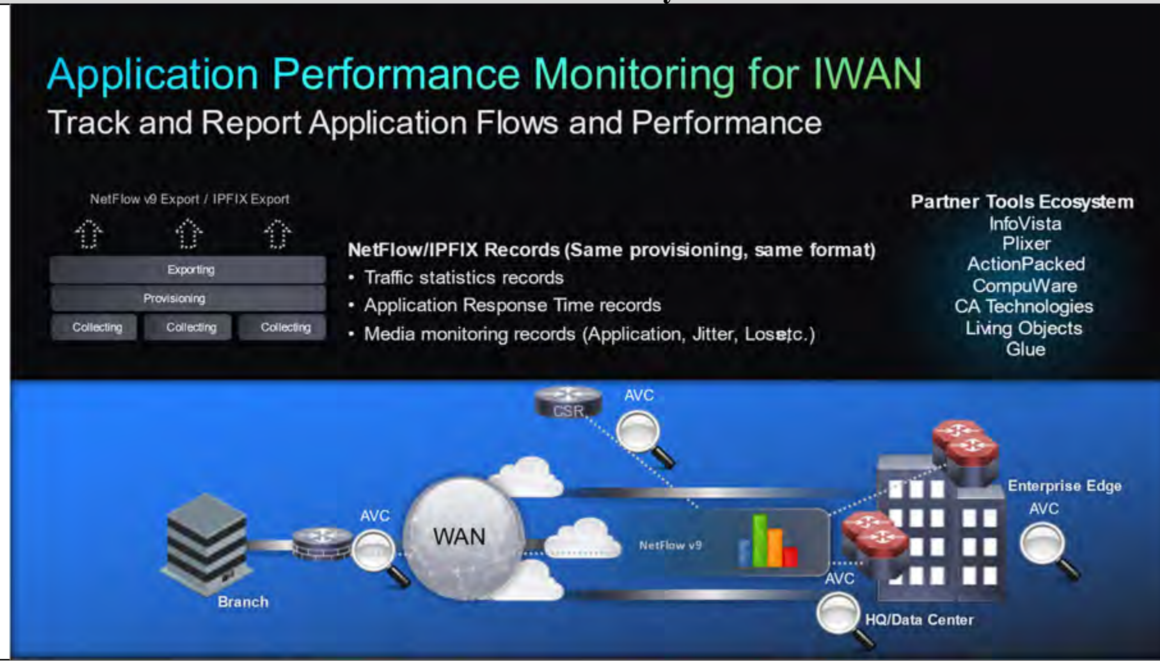
No.	’111 Patent Claim 5	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 5 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index. Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The

No.	’111 Patent Claim 5	Cisco IWAN System
		monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.”) Copeland [0079] (“Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0120] (“The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled packets, and other information avail-able from the sFlow data stream that may be important. For example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.”)

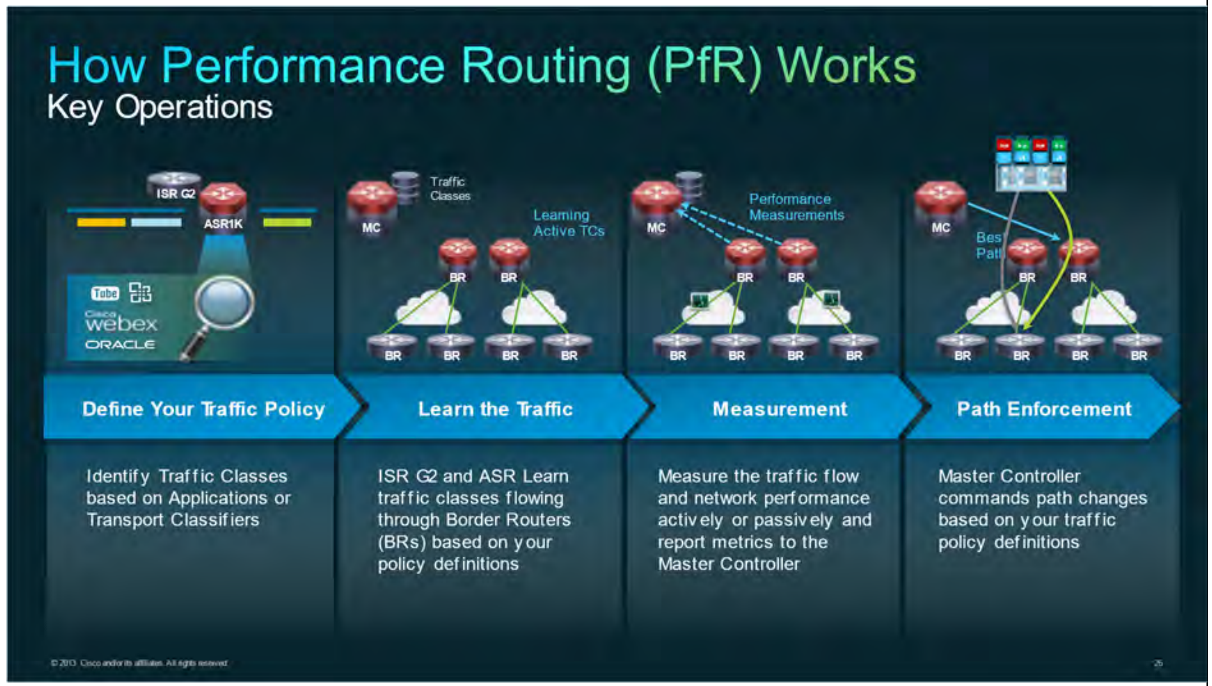
No.	’111 Patent Claim 5	Cisco IWAN System
		Copeland at [0126]-[0129] (“If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”) Copeland at [0144] (“Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”)

No.	’111 Patent Claim 5	Cisco IWAN System
		Copeland at [0159]-[0162] (“A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and: (a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”)

No.	’111 Patent Claim 6	Cisco IWAN System
6	The method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory.	Cisco IWAN System discloses the method according to claim 5, further comprising storing the received packet or a portion thereof, by the controller, in a memory. For example, Cisco IWAN System discloses storing traffic statistics and monitoring records of the traffic flow. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. *See supra* at Claim 5. Cisco IWAN

No.	’111 Patent Claim 6	Cisco IWAN System
		

No.	’111 Patent Claim 7	Cisco IWAN System
7	The method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller.	Cisco IWAN System discloses the method according to claim 5, further comprising responsive to the packet satisfying the criterion and to the instruction, sending a portion of the packet, by the network node, to the controller. For example, Cisco IWAN System discloses sending traffic flow metrics to the hub/master controller upon determining the traffic belongs to a particular traffic class. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, responsive to the packet satisfying the criterion and to instruction, sending a portion of the packet, by the network node, to the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 5.

No.	'111 Patent Claim 7	Cisco IWAN System
		Cisco Next Generation  Cisco IWAN

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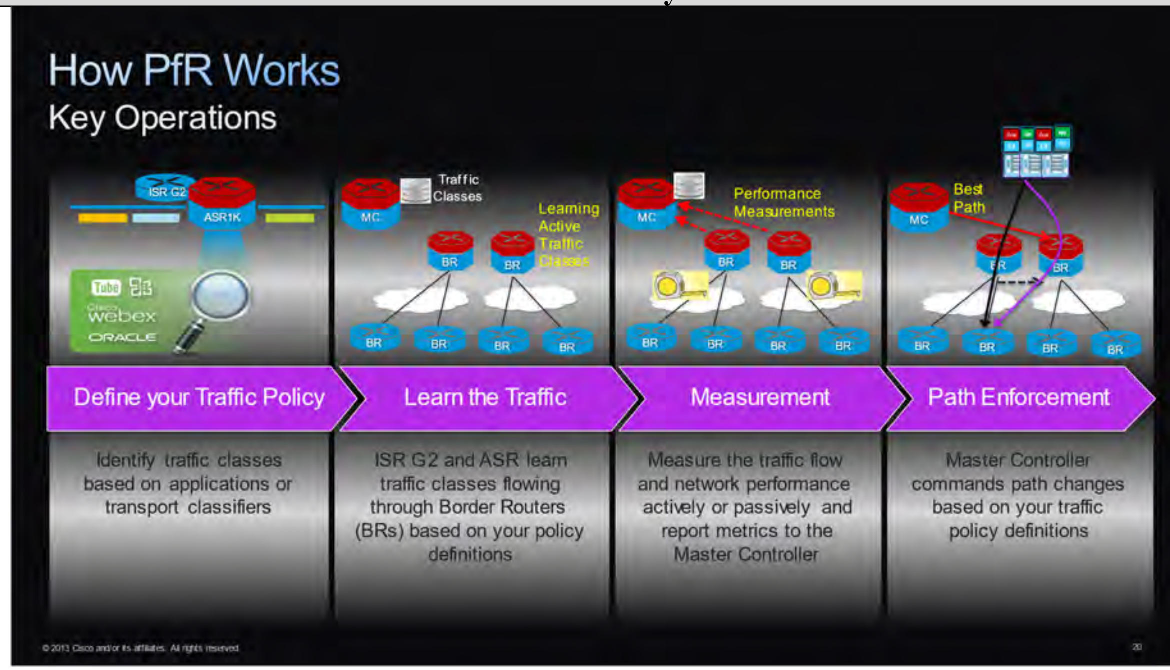
<tr><td></td><td></td><td>

Cisco IWAN - Uncompromised Experience</td></tr>
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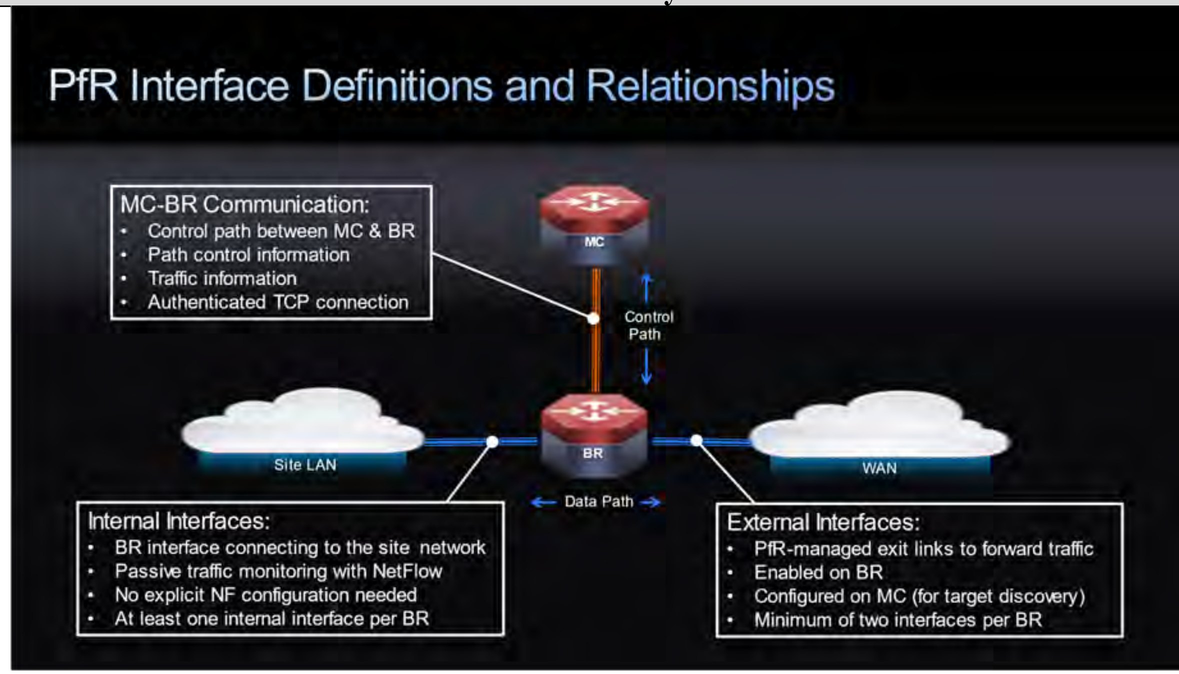
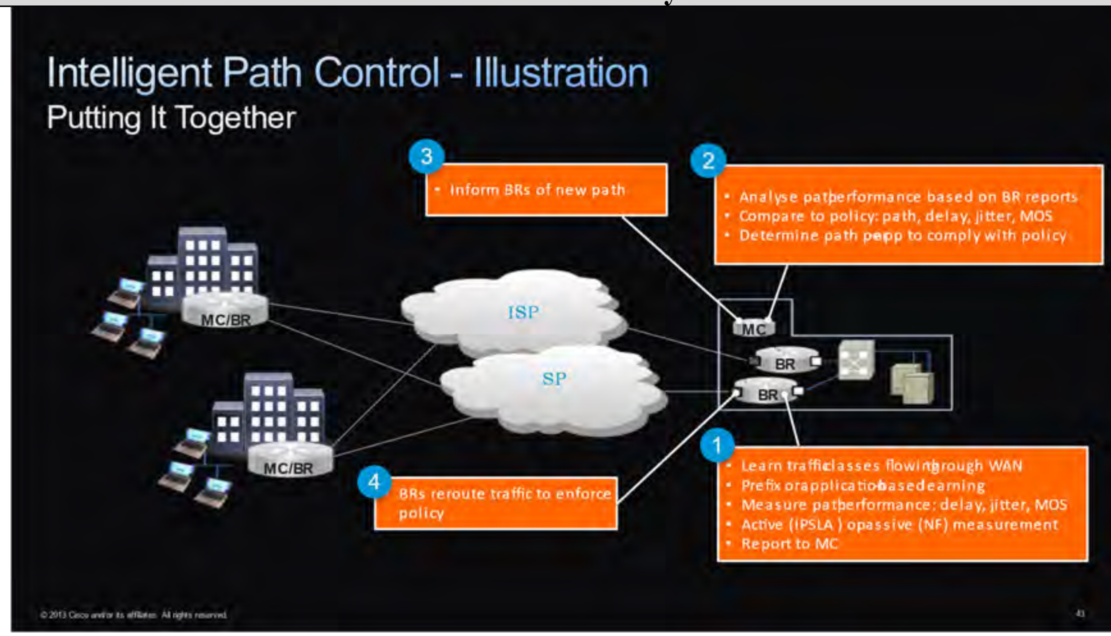
No.	’111 Patent Claim 7	Cisco IWAN System
		

No.	’111 Patent Claim 7	Cisco IWAN System



Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 5 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example.

For example, Copeland discloses sending packets and sampled packet headers to the intrusion detection engine on the monitoring appliance based on matching predetermined values associated with a concern index.

Copeland at [0067] (“The host servers 130 are directly or indirectly coupled to one or more network devices 135 such as routers or switches that support providing a sampled data stream such as that provided by sFlow. In a typical preferred configuration for the present invention, a monitoring appli-ance 150 operating a flow-based intrusion detection engine 155 is receiving sampled packet headers from one or more network devices 135. The

No.	'111 Patent Claim 7	Cisco IWAN System
		monitoring appliance 150 moni-tors the communications between the host server 130 and other hosts 120, 110 in the attempt to detect intrusion activity.") Copeland [0079] ("Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.") Copeland at [0097] ("The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.") Copeland at [0120] ("The sampled packet headers sent from the sFlow agent are captured and processed by the sample packet collector 505 in order to create a "Packet Data" data struc-ture that includes the sFlow agent source of the packets, the header of the sampled packets, and other information avail-able from the sFlow data stream that may be important. For example, one data field that is optionally available pr vides the username of the user using the computer at the time of the communications. This information is extremely useful in some environments subject to regulatory requirements and monitoring of the communications on the network. In this case the username will be stored as "supplementary infor-mation" for auditing purposes in the flow data. Other infor-mation, including the sampling device and the physical port on which the communications was detected may also be retained for other uses such as mitigation, where a host may be removed from the network.")

No.	’111 Patent Claim 7	Cisco IWAN System
		Copeland at [0126]-[0129] (“If a particular packet 101 being processed by the packet classifier 510 matches a particular entry or record in the flow data structure 162, data from that particular packet 101 is used to update the statistics in the corresponding flow data structure record. A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled packet matches and: (1) both port numbers match and no port is marked as the "server" port, or (2) the port number previously marked as the "server" port matches, or (3) one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).”) Copeland at [0144] (“Concern index (CI) values calculated from packet anomalies also add to a host's accumulated concern index value. Table II of FIG. 7 shows one scheme for assigning concern index values due to other events revealed by the flow analysis. For example, there are many combinations of TCP flag bits that are rarely or never seen in valid TCP connections. When the packet classifier thread 510 recog-nizes one of these combinations, it directly adds a predeter-mined value to the sending host's accumulated concern index value. When the packet classifier thread 510 searches along the flow linked-list (i.e. flow data 162) for a match to the current packet 101, it keeps count of the number of flows active with matching IP addresses but no matching port number. If this number exceeds a predetermined threshold value (e.g., 4) and is greater than the previous number noticed, CI is added for an amount corresponding to a "port scan." A bit in the host record is set to indicate that the host has received CI for "port scanning."”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”)

No.	'111 Patent Claim 7	Cisco IWAN System
		Copeland at [0159]-[0162] ("A packet 101 is considered to match to a flow data structure record if both IP numbers match and the source of the sampled data matches and: (a). both port numbers match and no port is marked as the "server" port, or (b). the port number previously marked as the "server" port matches, or (c). one of the port numbers matches, but the other does not, and the neither port number has been marked as the server port (in this case the matching port number is marked as the "server" port).")

No.	'111 Patent Claim 8	Cisco IWAN System
8[a]	The method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes, and	Cisco IWAN System discloses the method according to claim 7, wherein the portion of the packet consists of multiple consecutive bytes. On information and belief, Cisco IWAN System discloses fragmenting packets into smaller byte sizes. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, wherein the portion of the packet consists of multiple consecutive bytes would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 7. Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 8(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses consecutive bytes of a packet header field.

No.	'111 Patent Claim 8	Cisco IWAN System
		Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0087] ("In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers,

No.	’111 Patent Claim 8	Cisco IWAN System
		(i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x34,

No.	'111 Patent Claim 8	Cisco IWAN System
		indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.") Kempf at [0101] ("In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)") For example, Copeland discloses fragmenting packets into smaller byte sizes, including headers and flags. Copeland further discloses sending sampled packet headers, consisting of fragmented packets of consecutive bytes to the monitoring device. Copeland [0079] ("Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.")
8[b]	wherein the instruction comprises identification of the consecutive bytes in the packet.	Cisco IWAN System discloses wherein the instruction comprises identification of the consecutive bytes in the packet. On information and belief, Cisco IWAN System discloses wherein the instruction comprises identification of the consecutive bytes in the packet. Thus, at least under the apparent claim

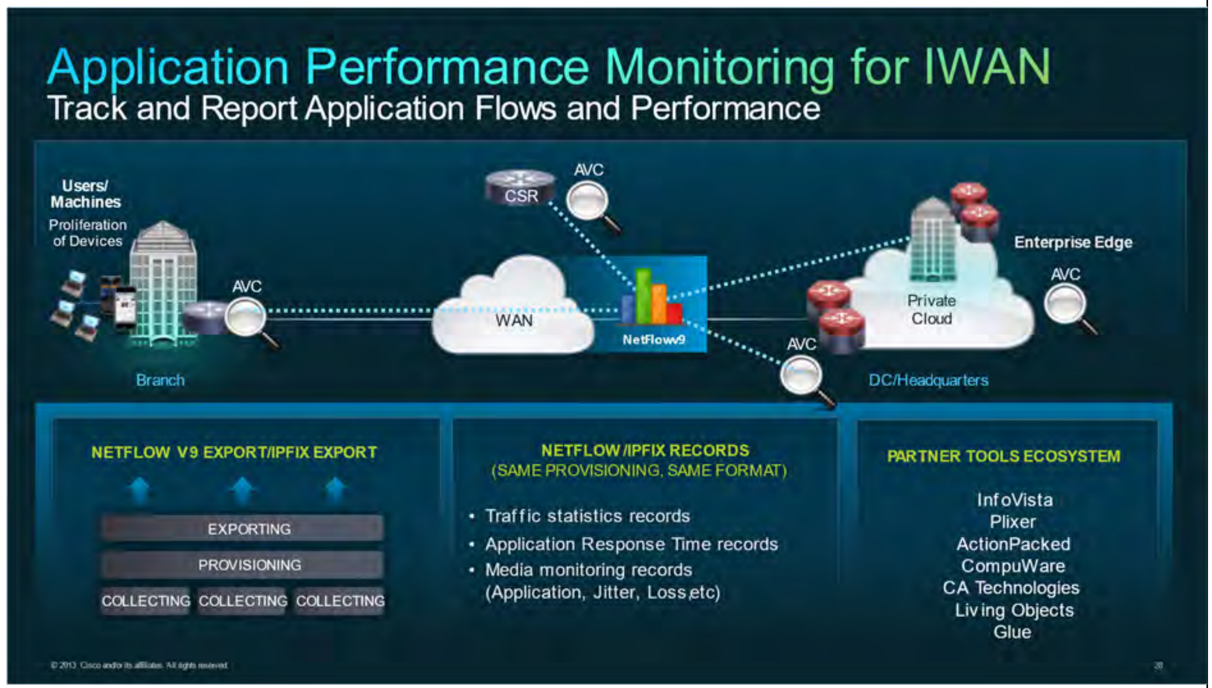
No.	'111 Patent Claim 8	Cisco IWAN System
		scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, coupling each of the one or more interface modules to a communication network using a second group of second physical links arranged in parallel would have been obvious to a person having ordinary skill in the art, as explained below. Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 8(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Kempf discloses rules in which the flow table includes matching to the consecutive bytes of a packet header. Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller.

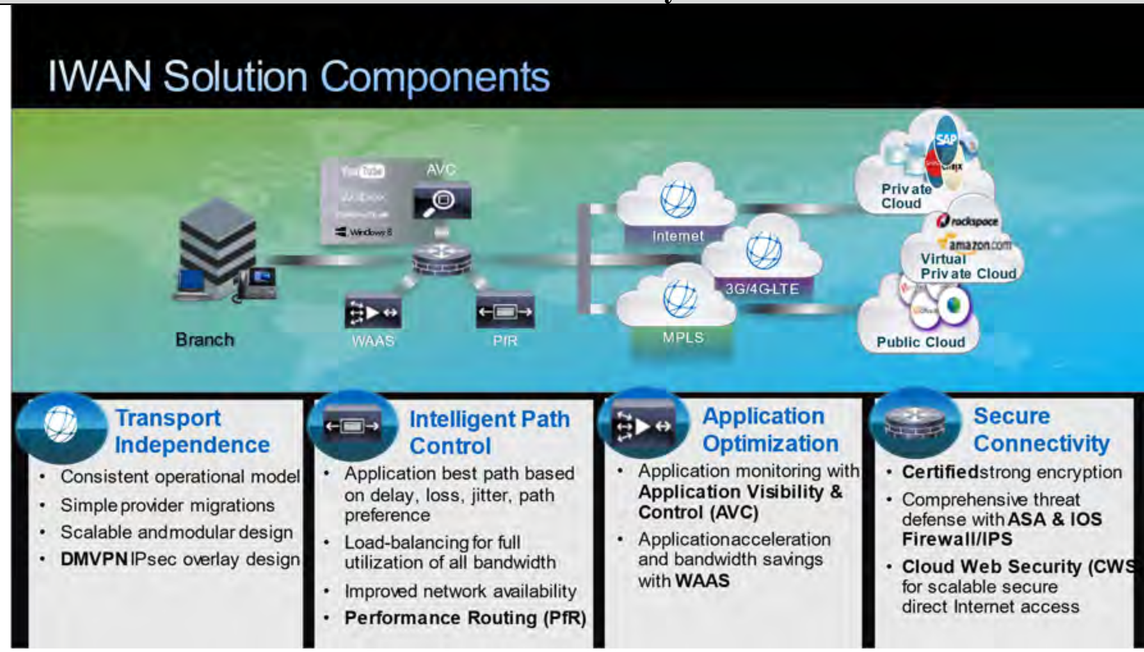
No.	’111 Patent Claim 8	Cisco IWAN System
		since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0087] (“In one embodiment, slow path support for GTP is implemented with an OpenFlow gateway switch. An Open-Flow mobile gateway switch also contains support on the software control plane for slow path packet processing. This path is taken by G-PDU (message type 255) packets with nonzero header fields or extension headers, and user data plane packets requiring encapsulation with such fields or addition of extension headers, and by G TP-U control packets. For this purpose, the switch supports three local ports in the software control plane: LOCAL_GTP _CONTROL-the switch fast path forwards GTP encapsulated packets directed to the gateway IP address that contain GTP-U control mes-sages and the local switch software control plane initiates local control plane actions depending on the GTP-U control message; LOCAL_GTP _U_DECAP-the switch fast path forwards G-PDU packets to this port that have nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path processes the packets and performs the specialized handling; and LOCAL_GTP _U_ENCAP-the switch fast path forwards user data plane packets to this port that require encapsulation in a GTP tunnel with nonzero header fields or extension headers (i.e. E!=0, S!=0, or PN!=0). These packets require specialized handling. The local switch software slow path encapsulates the packets and performs the specialized handling. In addition to forwarding the packet, the switch fast path makes the OpenFlow metadata field avail-able to the slow path software.”) Kempf at [0091] (“When a packet header matches a rule associated with the virtual port, the GTP TEID is written into the lower 32 bits of the metadata and the packet is directed to the virtual port. The virtual port calculates the hash of the TEID and looks up the tunnel header information in the tunnel header table. If no such tunnel information is present, the packet is forwarded to the controller with an error indication. Other-wise, the virtual port constructs a GTP tunnel header and encapsulates the packet. Any DSCP bits or VLAN priority bits are additionally set in the IP or MAC tunnel headers, and any VLAN tags or MPLS labels are pushed onto the packet. The encapsulated packet is forwarded out the physical port to which the virtual port is bound.”)

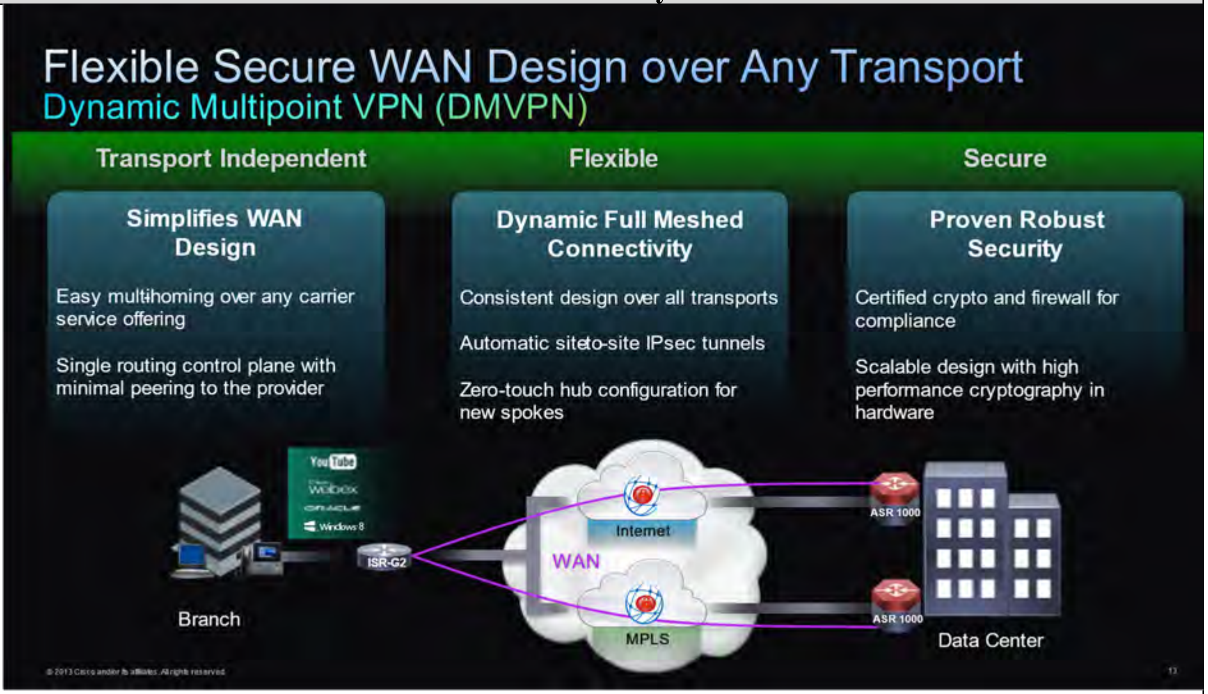
No.	'111 Patent Claim 8	Cisco IWAN System
		Kempf at [0092] ("In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.") Kempf at [0098] ("The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.") Kempf at [0101] ("In one embodiment, the system implements han-dling of user data plane packets requiring GTP-U encapsula-tion with extension headers, sequence numbers, and N-PDU numbers. User data plane packets that require extension head-ers, sequence numbers, or N-PDU numbers during GTP encapsulation require special handling by the software slow path. For these packets, the OpenFlow controller programs a rule matching the 4 tuple: IP source address; IP destination address; UDP/TCP/SCTP source port; and UDP/TCP/SCTP destination port. The instructions for matching packets are: Write-Metadata (GTP-TEID, 0x FFFFFFFF) Apply-Actions (Set-Output-Port LOCAL_GTP _U_ENCAP)")

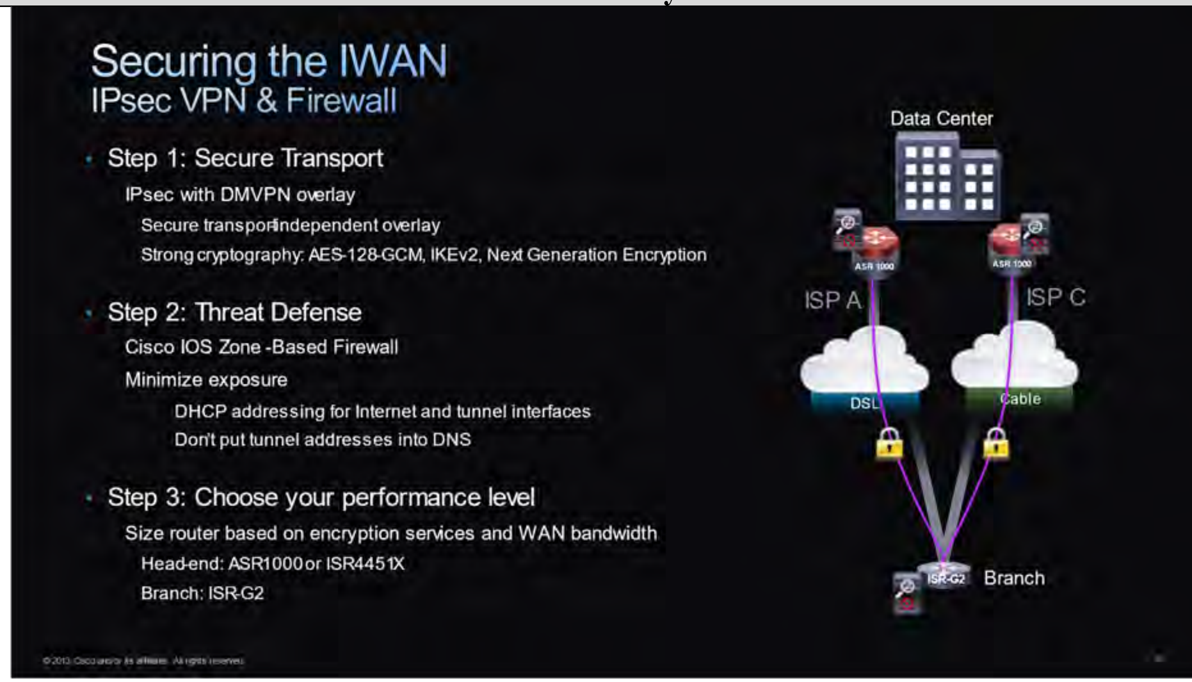
No.	'111 Patent Claim 8	Cisco IWAN System
		For example, Copeland discloses identifying the sampled packet headers comprised of fragmented packets of smaller byte sizes. Copeland [0079] ("Large packets tend to be fragmented by networks that cannot handle a large packet size. A 16-bit packet identification is used to reassemble fragmented packets. Three one-bit set of fragmentation flags control whether a packet is or may be fragmented. The 13-bit fragment offset is a sequence number for the 4-byte words in the packet when reassembled. In a series of fragments, the first offset will be zero.") Copeland at [0080] ("After the fragmentation information, an 8-bit time to live field specifies the remaining life of a packet and is decremented each time the packet is relayed. If this field is 0, the packet is destroyed. Next is an 8-bit protocol field that specifies the transport protocol used in the data portion. The following 16-bit field is a header checksum on the header only. Finally, the last two fields illustrated contain the 32-bit source address and 32-bit destination address. IP packet data follows the address information.") Copeland at [0081] ("In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.")

No.	'111 Patent Claim 9	Cisco IWAN System
9	The method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller.	Cisco IWAN System discloses the method according to claim 5, further comprising responsive to receiving the packet, analyzing the packet, by the controller. For example, Cisco IWAN System discloses analyzing traffic flow metrics received by the hub/master controller to update and change traffic policy definitions. Thus, at least under the apparent claim scope alleged by Orckit's Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation,

No.	'111 Patent Claim 9	Cisco IWAN System
		responsive to receiving the packet, analyzing the packet, by the controller would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 5. Cisco Next Generation  Cisco IWAN

No.	'111 Patent Claim 9	Cisco IWAN System
		 Cisco IWAN

No.	’111 Patent Claim 9	Cisco IWAN System
		 Cisco IWAN

No.	’111 Patent Claim 9	Cisco IWAN System
		

<table>
<tr><th>No.</th><th>’111 Patent Claim 9</th><th>Cisco IWAN System</th></tr>
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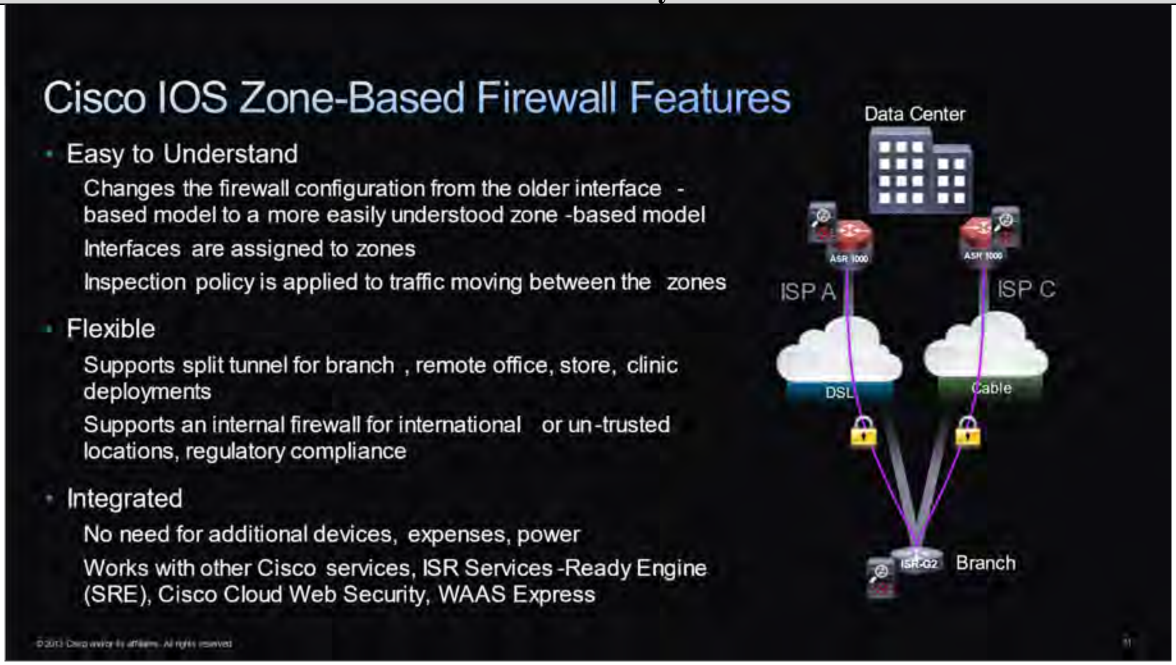
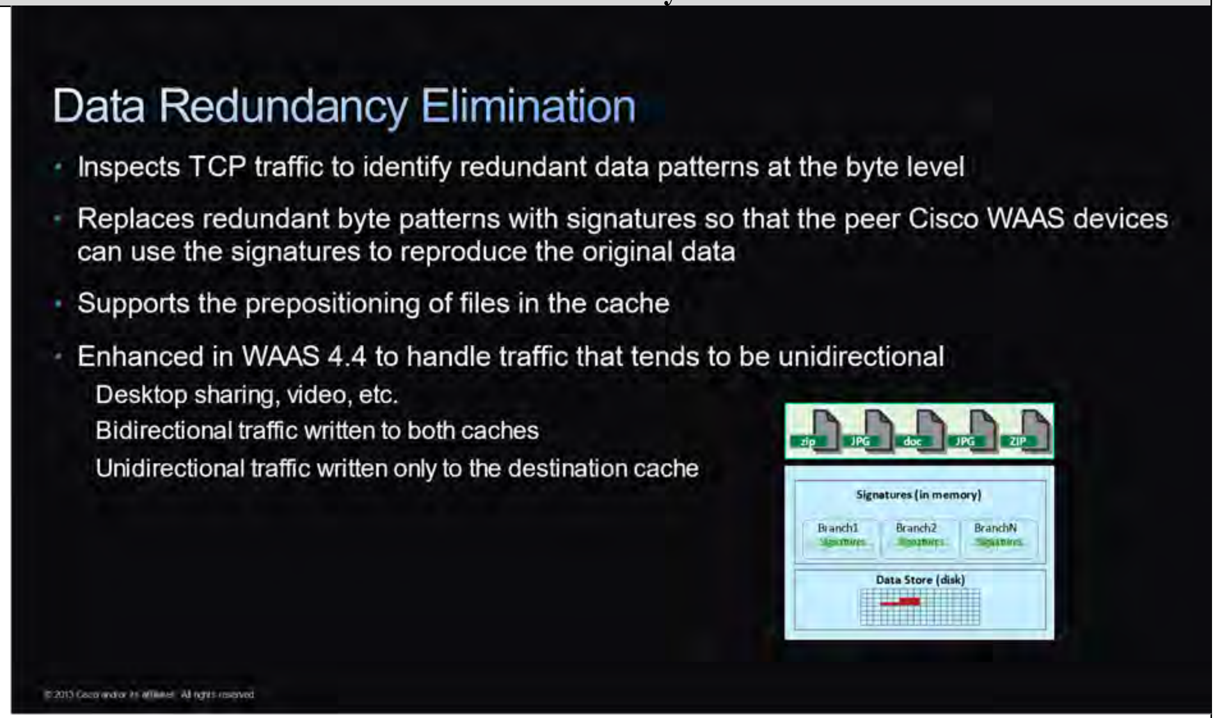
No.	’111 Patent Claim 9	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	'111 Patent Claim 9	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 9 of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Swenson discloses the network controller comprising a flow analyzer for analyzing and inspecting the packet. Swenson at [0026] ("The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further

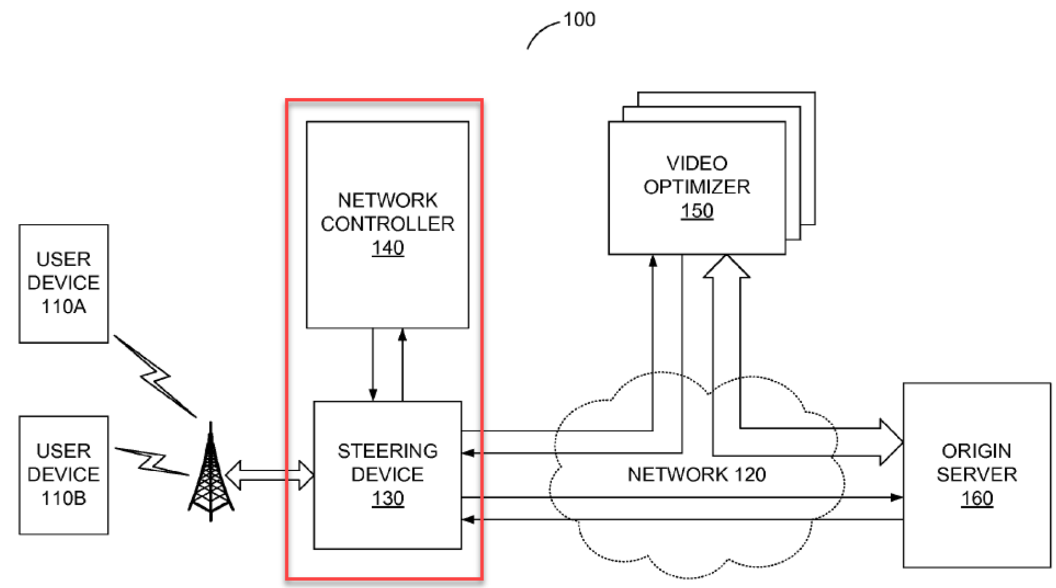
No.	’111 Patent Claim 9	Cisco IWAN System
		inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0028] (“In contrast to conventional inline TCP throughput monitoring devices that monitor every single data packets transmitted and received, the network controller 140 is an "out-of-band" computer server that interfaces with the steer-ing device 130 to selectively inspect user flows of interest. The network controller 140 may further identify user flows (e.g., among the flows of interest) for optimization. In one embodiment, the network controller 140 may be imple-mented at the steering device 130 to monitor traffic. In other embodiments, the network controller 140 is coupled to and communicates with the steering device 130 for traffic moni-toring and optimization. When queried by the steering device 130, the network controller 140 determines if a given network flow should be ignored, monitored further or optimized. Opti-mization of a flow is often decided at the beginning of the flow because it is rarely possible to switch to optimized content mid-stream once non-optimized content delivery has begun. However, the network controller 140 may determine that existing flows associated with a particular subscriber or other entity should be optimized. In turn, new flows (e.g., resulting from seek requests in media, new media requests, resume after pause, etc.) determined to be associated with the entity may be optimized. The network controller 140 uses the net-work state as well as historical traffic data in its decision for monitoring and optimization. Knowledge on the current net-work state, such as congestion, deems critical when it comes to data optimization.”) Swenson at [0029] (“As a flow is sent to the network controller 140 for inspection, historical network traffic data stored at the net-work controller 140 may be searched. The historical network traffic data includes information such as subscriber informa-tion, the cell towers to which the user devices attached, rout-ers through which the traffic is passing, geography regions, the backhaul segments, and time-of-day of the flows. For example, in a mobile network, the cell tower to which a user device is attached can be most useful, since it is the location where most congestion occurs due to limited bandwidth and high cost of the radio access network infrastructure. The network controller 140 looks into the historical traffic data for the average of the bandwidth per user at the particular cell tower. The

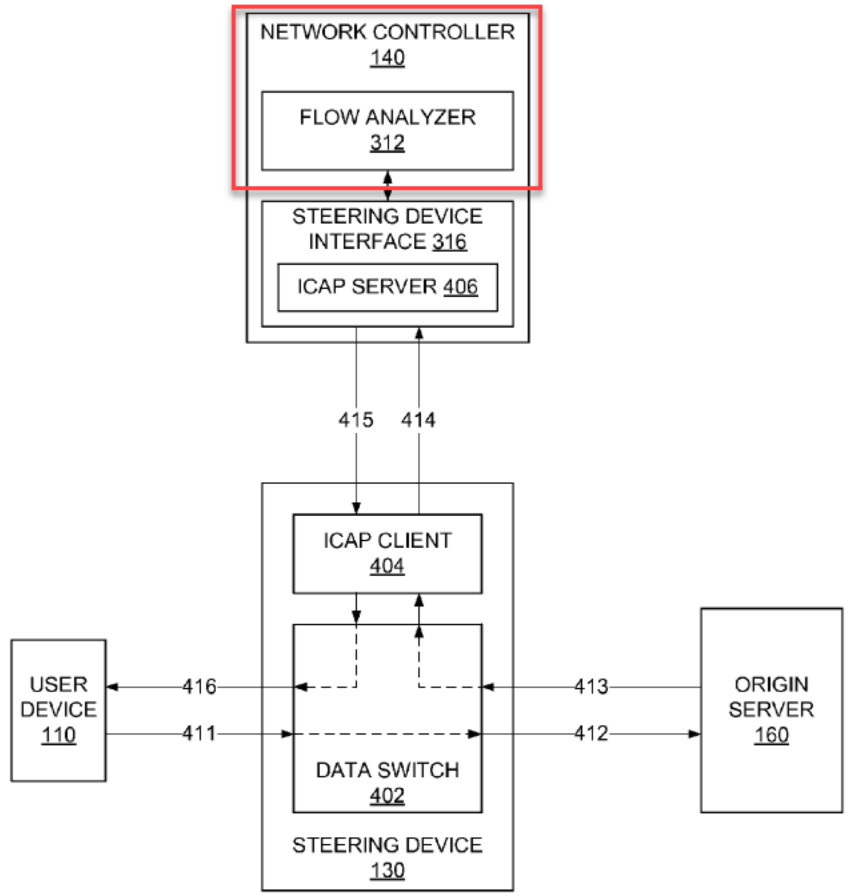
No.	’111 Patent Claim 9	Cisco IWAN System
		network controller 140 can then estimate the amount of bandwidth or degree of congestion for the new flow based on the historical record.”) Swenson at [0038] (“Turning back to FIG. 1, the network controller 140 allows network operators to apply fine granular optimization policies to ensure high quality of experience (QoE) based on cell tower congestion, device types, subscriber profiles and service plans with lower hardware and software costs. The architecture of the network controller 140 provides an excel-lent fit for the net neutrality guideline of "reasonable network management", and better compliance to the copyright law (DMCA) than solutions that rely on long-term caching. Hav-ing the ability of monitoring network traffic on a per sub-scriber, per flow, or per video file basis, the network controller 140 also selectively monitors and optimizes only a subset of traffic that benefits from optimization the most, thus achiev-ing both scalability and efficiency for optimization at a com-petitive price-point. The core element of the network control-ler 140 lies in its mechanisms for congestion detection and mitigation, which allows optimization resources to be utilized in the most efficient and surgical manner.”) Swenson at [0039] (“Referring now to FIG. 3, it illustrates one embodi-ment of an example architecture of the network controller 140 for providing selective real-time network monitoring and subscriber identification. The network controller 140 com-prises a flow analyzer 312, a policy engine 314, a steering device interface 316, a video optimizer redirector 318, a flow cache 322, and a subscriber log 324. In other embodiments, the network controller 140 may include additional, fewer, or different components for various applications. Conventional components such as network interfaces, security functions, failover servers, management and network operations con-soles, and the like are not shown so as to not obscure the details of the system architecture.”) Swenson at [0059] (“In one embodiment, as the steering device 130 monitors network responses, it is looking for flows that match one or more signatures for video and images. When a match-ing flow is detected, the steering device 130 forwards the HTTP request and a portion of the HTTP response to the network controller 140 over the ICAP client interface 404. After receiving the request and the portion of response at the ICAP server interface 406, the flow analyzer 312 of the net-work controller 140 performs a deep flow inspection to deter-mine if the flow is worth bandwidth monitoring and/or user detection. For example,

No.	’111 Patent Claim 9	Cisco IWAN System
		the flow inspection performed by the flow analyzer 312 may determine if the flow indeed contains large or medium object (e.g., larger than 50 kB), and/or if the source IP address of the flow is from a user or a group of users that are required to be monitored by policies. The flow ana-lyzer 312 may also determine if the flow needs to be opti-mized based on historical flow statistical data.”) Swenson at [0060] (“If the flow is deemed of interest, the steering device 130 is notified to steer the flow through the network controller 140. This is known as the "continue" working mode for bandwidth monitoring. In the "continue" mode, the network controller 140 interfaces with the steering device 130 to func-tion, on-demand, as a traditional inline network element for flows deemed of interest. Thus, the network controller 140 ingests the network flow for inspection and subsequently forwards the network flow on the network response path. For example, for this particular flow, the origin server 160 responds to the user request by sending video or images over the network link 413 to the steering device 130, which for-wards the video or images to the network controller 140 over a network link 414. After the network controller 140 updates the flow statistics, the video or images are returned to the steering device 130 over a network link 415, which transmits the video or images to the user device 110 over the network link 416.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of

No.	’111 Patent Claim 9	Cisco IWAN System
		interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this

No.	’111 Patent Claim 9	Cisco IWAN System
		case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0071] (“After receiving the request, the video optimizer 150 forwards the video HTTP GET requests 622 to the origin server 160 and in return, receives a video file 624 from the origin server 160. The video optimizer 150 transcodes the video file to a format usable by the client device 110 based on network bandwidth available to the user device 110. The optimized video 626 is then transmitted from the video opti-mizer 150 to the steering device 130. In one embodiment, the steering device 130 intercepts the optimized video 626. The steering device 130 will then send an ICAP request to the network controller 140 for inspection. The network controller 140 deems this flow to be monitored and sends ICAP response 630. The steering device 130 then allows the flow to go through to the user device 110. The steering device 130 next sends periodic ICAP "counting" updates 632 to the network controller 140 until the flow completes. As such, the client receives the optimized video 626 for substantially real-time playback on an application executing on the user device 110.”) Swenson at Figure 1 (annotation added)

No.	’111 Patent Claim 9	Cisco IWAN System
		 FIG. 1 Swenson at Figure 4A (annotation added)

No.	'111 Patent Claim 9	Cisco IWAN System
		 **FIG. 4A** For example, Copeland discloses analyzing packets received by the intrusion detection engine on the monitoring appliance.

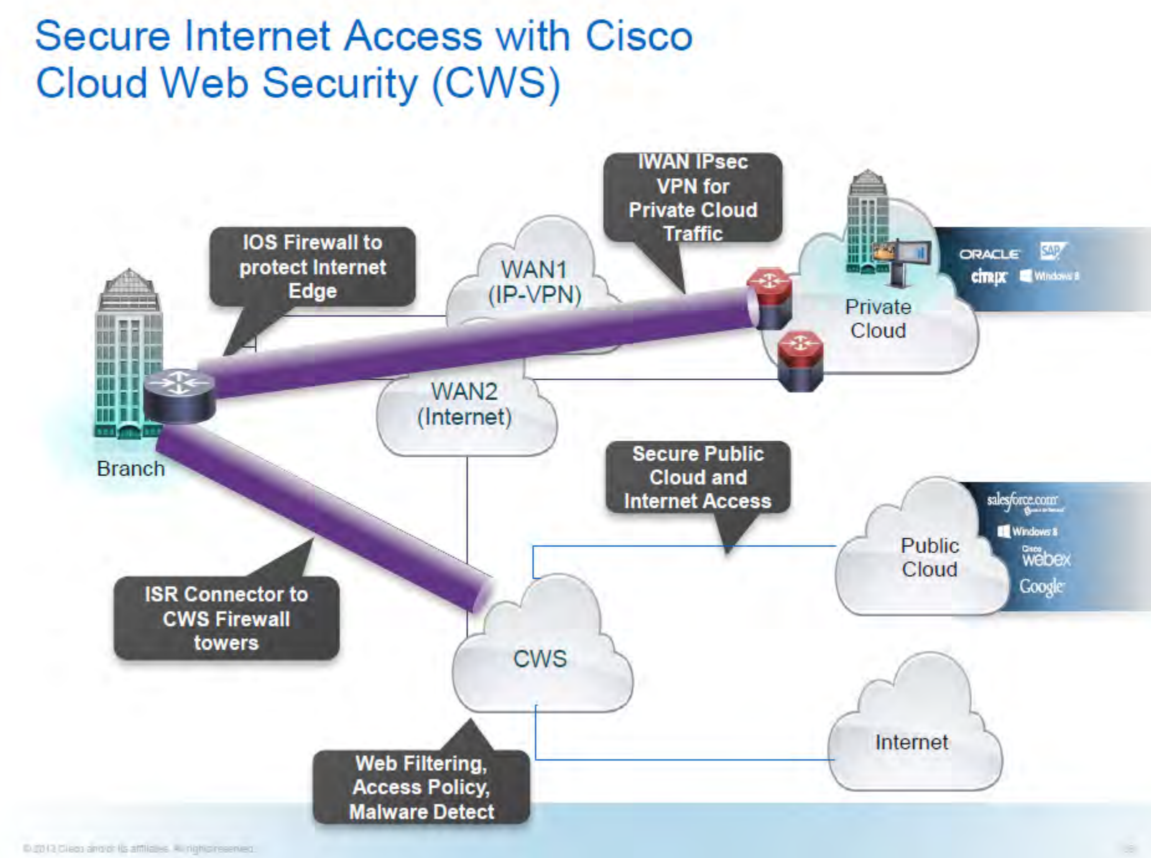
No.	’111 Patent Claim 9	Cisco IWAN System
		Copeland at [0021] (“The present invention provides an accurate and reliable method for detecting network attacks through the use of sampled packet headers that are provided by a source such as that as defined in sFlow and further based in large part on "flows" as opposed to signatures or anomalies. By utilizing the host and flow information structures that are inherent with flow-based analysis and applying rules of statistical significance and analysis, the intrusion detection system can operate with sampled data such as provided by sFlow in order to provide a hybrid solution that combines many of the benefits of a packet capture implementation with the distributed nature of an IDS that operates on Netflow, thus providing an enhanced wide-area IDS solu-tion.”) Copeland at [0023] (“According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.”) Copeland at [0024] (“Generally speaking, the intrusion detection system analyzes network communication traffic for potential detrimental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.”) Copeland at [0027] (“According to one aspect of the invention, the detection system works by assigning sampled data packets to various client/server (C/S) flows. Statistics are

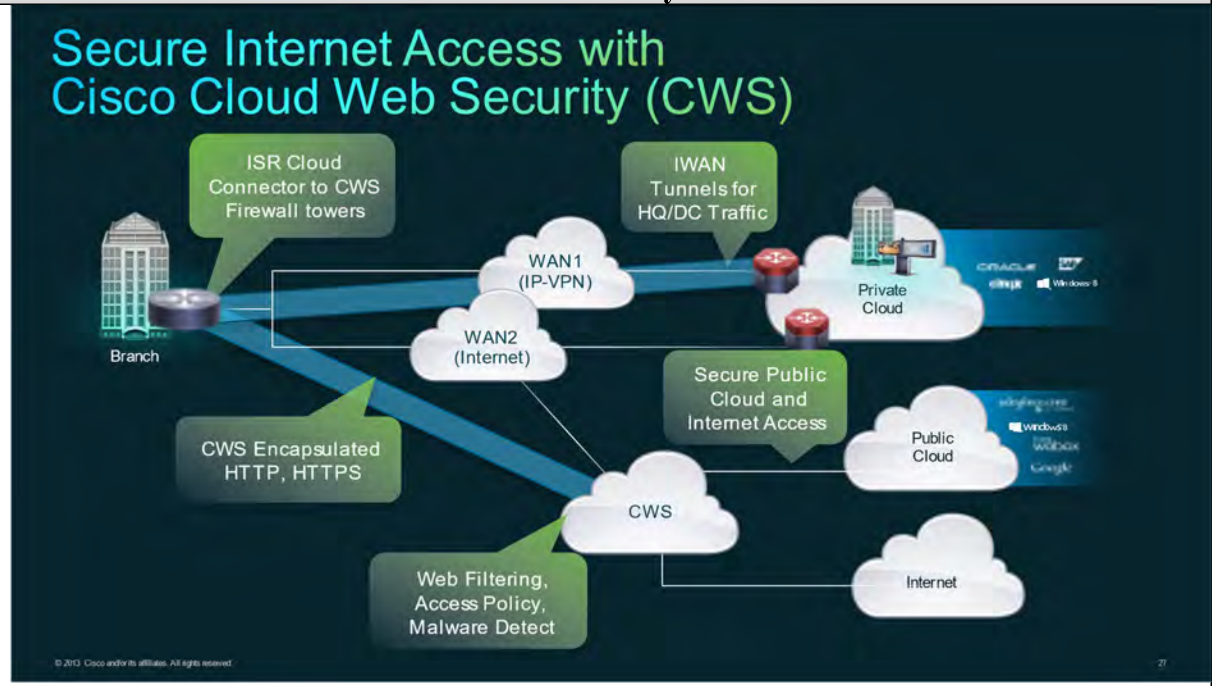
No.	’111 Patent Claim 9	Cisco IWAN System
		collected for each determined flow. Then, the flow statistics are analyzed to determine if the flow appears to be legitimate traffic or possible suspicious activity. A value, referred to as a "concern index," is assigned to each flow that appears suspicious. By assigning a value to each flow that appears suspicious and adding that value to an accumulated concern index associated with the responsible host, it is possible to identify hosts that are engaged in intruder activity without generation of significant unwarranted false alarms. When the concern index value of a host exceeds a preset alarm value, an alert is issued and appropriate action can be taken.”) Copeland at [0028] (“Generally speaking, the intrusion detection system analyzes network communication traffic for potential detri-mental activity. The system collects flow data from sampled packet headers between two hosts or Internet Protocol (IP) addresses. Collecting flow data from packet headers asso-ciated with a single service where at least one port remains constant allows for more efficient analysis of the flow data. The collected flow data is analyzed to assign a concern index value to the flow based upon a probability that the flow was not normal for data communications. A host list is main-tained containing an accumulated concern index derived from the flows associated with the host. Once the accumu-lated concern index has exceeded an alarm threshold value, an alarm signal is generated.”) Copeland at [0063] (“Consequently, abnormal flows and/or events iden-tified by the intrusion detection engine 155 will raise the concern index (CI) for the associated host. The intrusion detection engine 155 analyzes the data flow between IP devices. However, different types of services have different flow characteristics associated with that service. Therefore, a C/S flow can be determined by the packets exchanged between the two hosts dealing with the same service.”) Copeland at [0065] (“The intrusion detection engine 155 analyzes the flow data 160 to determine if the flow appears to be legitimate traffic or possible suspicious activity. Flows with suspicious activity are assigned a predetermined concern index (CI) value based upon a heuristically predetermined assessment of the significance of the threat of the particular traffic or flow or suspicious activity. The flow concern index values have been derived heuristically from extensive net-work traffic analysis. Concern index values are associated with particular hosts and stored in the host data structure 166 (FIG. 1). Exemplary concern

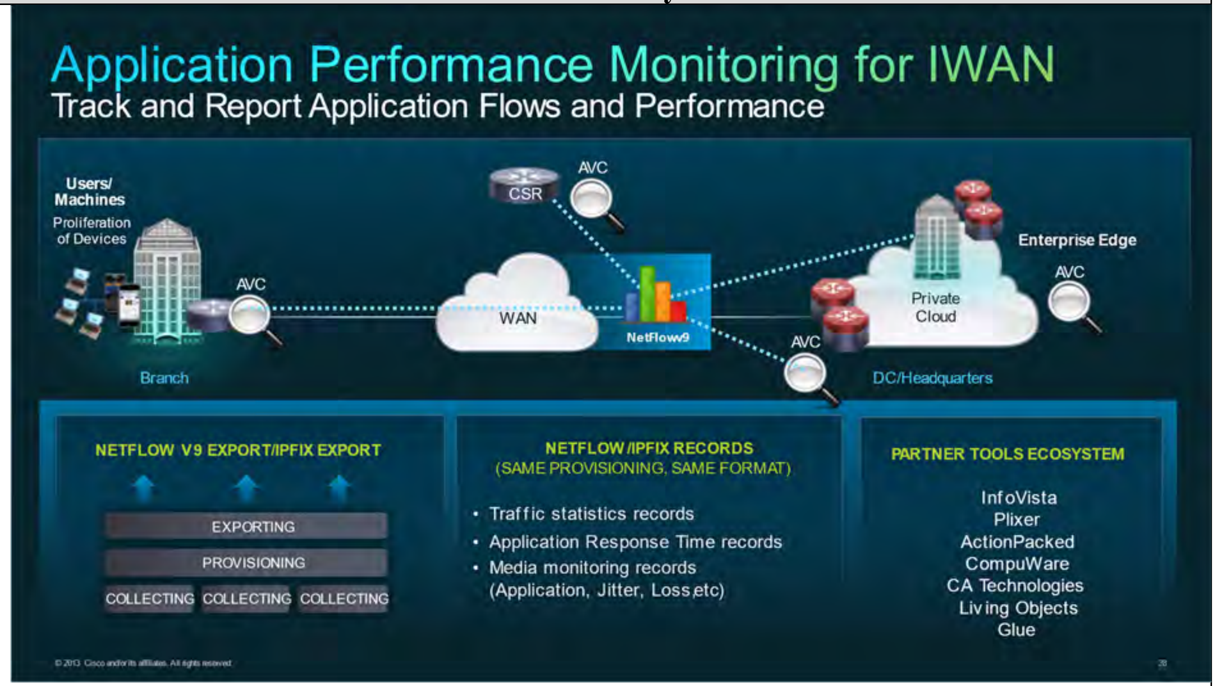
No.	’111 Patent Claim 9	Cisco IWAN System
		index values for various exemplary flow-based events and other types of events are illustrated in connection with FIGS. 6 and 7.) Copeland at [0069] (“It will now be appreciated that the disclosed meth-odology of intrusion detection is accomplished at least in part by analyzing communication flows to determine if such communications have the flow characteristics of probes or attacks. By analyzing communications for abnormal flow characteristics, attacks can be determined without the need for resource-intensive packet data analysis. A flow can be determined from the packets 101 that are transmitted between two hosts utilizing a single service. The addresses and port numbers of communications are easily discerned by analysis of the header information in a datagram.”) Copeland at [0087] (“As previously stated, the flow-based engine 155 does not analyze the data segments of packets for signature identification. Instead, the engine 155 associates all packets with a flow. It analyzes certain statistical data and assigns a concern index value to abnormal activity. The engine 155 builds a concern index for suspicious hosts by detecting suspicious activities on the network. An alarm is generated when those hosts build enough concern (in the form of a cumulated CI value) to cross the network administrator's predetermined threshold.”) Copeland at [0097] (“The described TCP session 300 of FIG. 3 is a generic TCP session in which a network might engage. In accordance with the invention, flow data is collected about the session to help determine if the communication is abnormal. In the preferred embodiment, information such as the total number of packets sent, the total amount of data sent, the session start time and duration, and the TCP flags set in all of the packets, are collected, stored in the database 160, and analyzed to determine if the communication was suspicious. If a communication is deemed suspicious, i.e. it meets predetermined criteria, a predetermined concern index value associated with a determined category of suspicious activity is added to the cumulated CI value associated with the host that made the communication.”) Copeland at [0111] (“As shown, the packets exchanged between two hosts associated with a single service can determine a flow. A port number designates a service application that is associated with the particular port. Communications utiliz-ing differing protocols or services

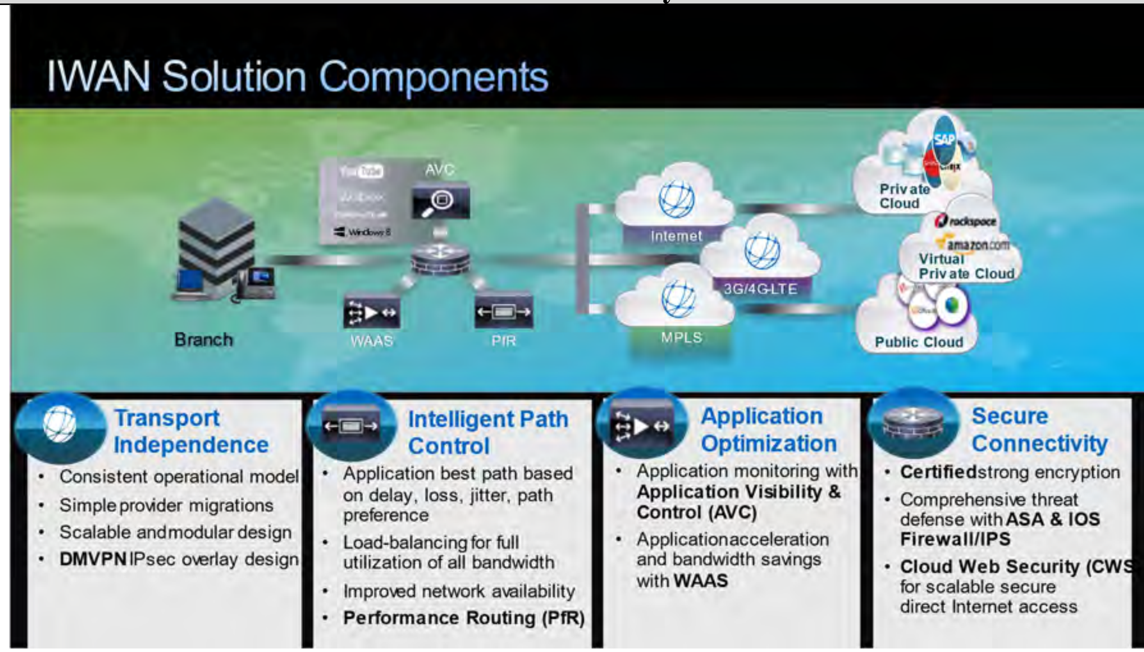
No.	’111 Patent Claim 9	Cisco IWAN System
		provide differing flow characteristics. Consequently, the flow engine 155 analyzes each of the services separately.”) Copeland at [0150] (“A preferred hardware configuration 800 of an embodiment that executes the functions of the above-described flow-based engine is described in reference to FIG. 8. FIG. 8 illustrates a typically hardware configuration 800 for a network intrusion detection system. A monitoring appliance 150 serves as a pass-by filter of network traffic. A network device 135, such as a router or switch supporting sFlow provides the location for connecting the monitoring appliance 150 to the network 899 for monitoring the network traffic.”)

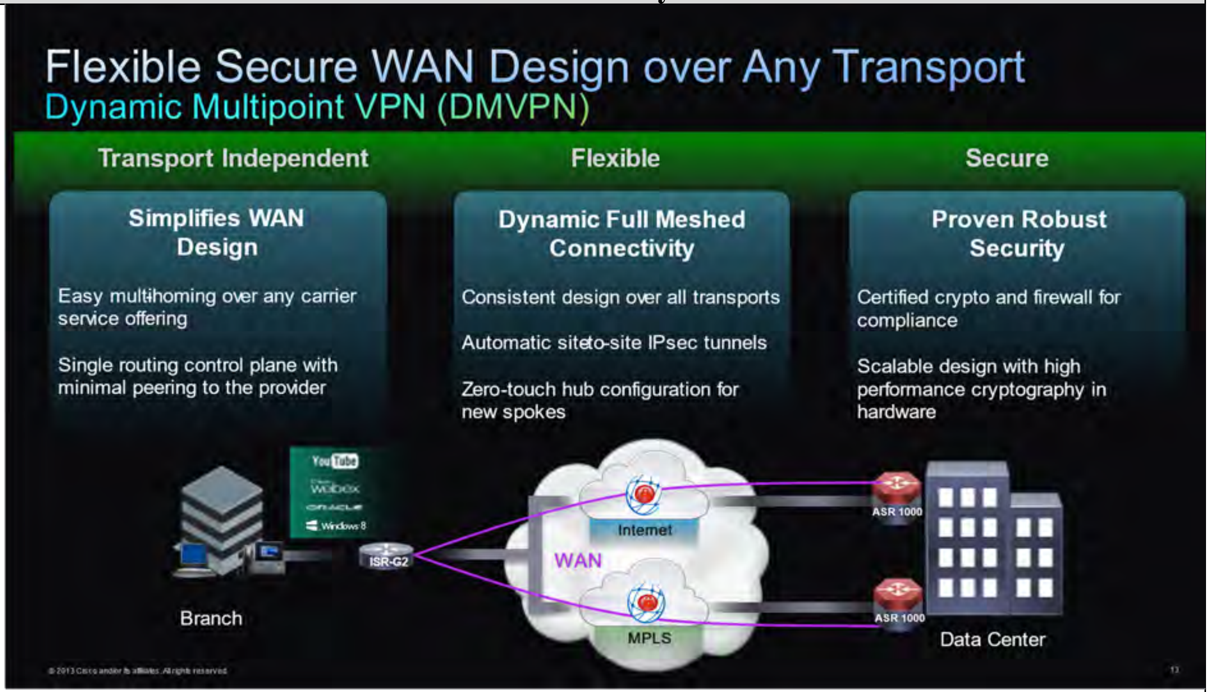
No.	’111 Patent Claim 12	Cisco IWAN System
12	The method according to claim 9, wherein the analyzing comprises applying security or data analytic application.	Cisco IWAN System discloses the method according to claim 9, wherein the analyzing comprises applying security or data analytic application. For example, Cisco IWAN System discloses analyzing traffic flow metrics with secure transport and application performance monitoring. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. *See supra* at Claim 9. IWAN Next Gen at 33

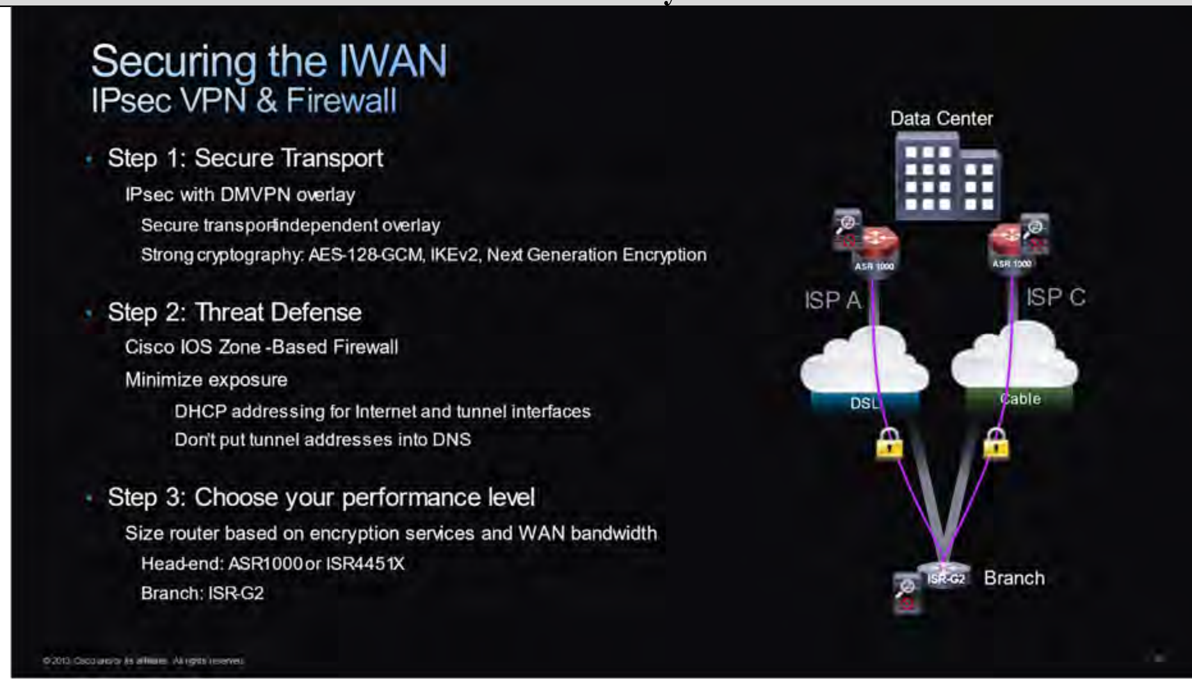
No.	’111 Patent Claim 12	Cisco IWAN System
		 Cisco Next Generation

No.	’111 Patent Claim 12	Cisco IWAN System
		 Cisco Next Generation

No.	'111 Patent Claim 12	Cisco IWAN System
		 Cisco IWAN

No.	'111 Patent Claim 12	Cisco IWAN System
		 Cisco IWAN

No.	'111 Patent Claim 12	Cisco IWAN System
		 Cisco IWAN

No.	’111 Patent Claim 12	Cisco IWAN System
		

<table>
<tr><th>No.</th><th>’111 Patent Claim 12</th><th>Cisco IWAN System</th></tr>
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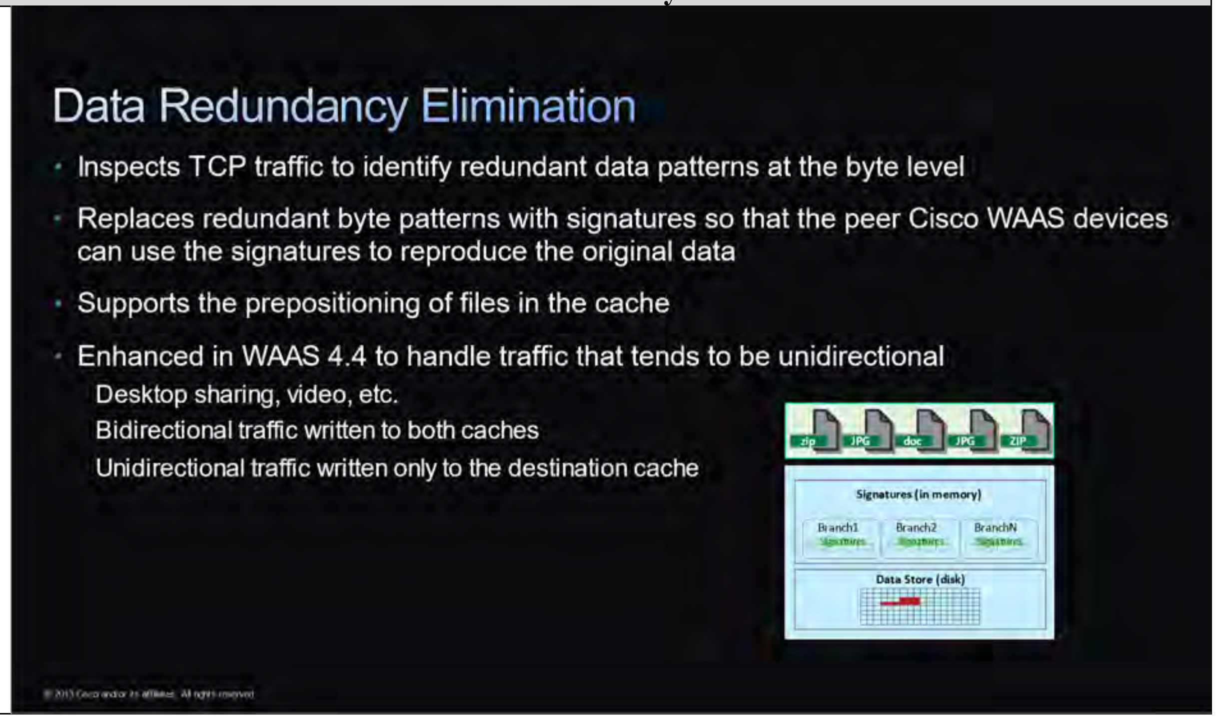
No.	’111 Patent Claim 12	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	’111 Patent Claim 12	Cisco IWAN System
		

No.	’111 Patent Claim 13	Cisco IWAN System
13	The method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality.	Cisco IWAN System discloses the method according to claim 9, wherein the analyzing comprises applying security application that comprises firewall or intrusion detection functionality. For example, Cisco IWAN System discloses analyzing traffic flow metrics with zone based firewall and integrated threat defense functionality. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. *See supra* at Claim 9. IWAN Next Gen at 33

<table>
<tr><th>No.</th><th>’111 Patent Claim 13</th><th>Cisco IWAN System</th></tr>
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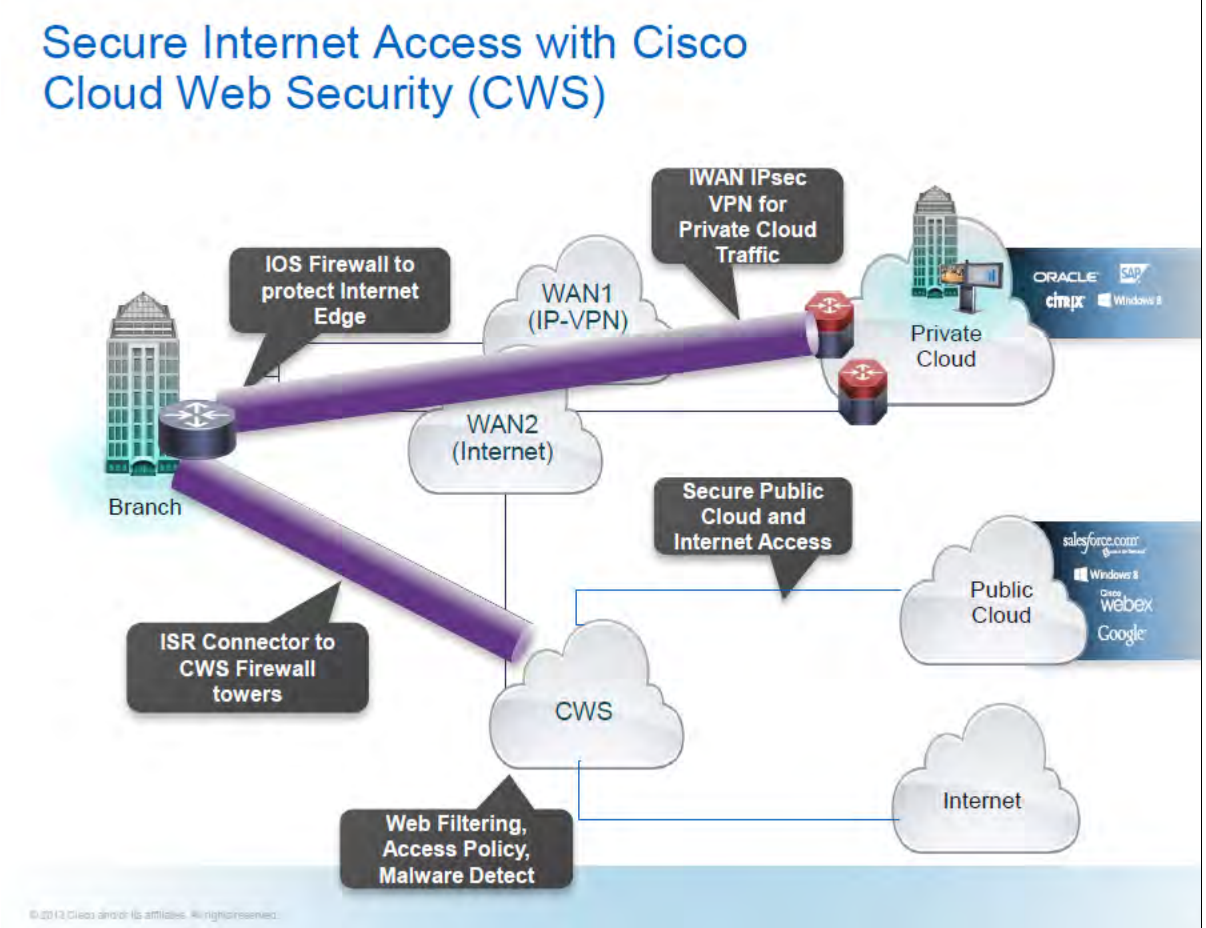

Cisco Next Generation
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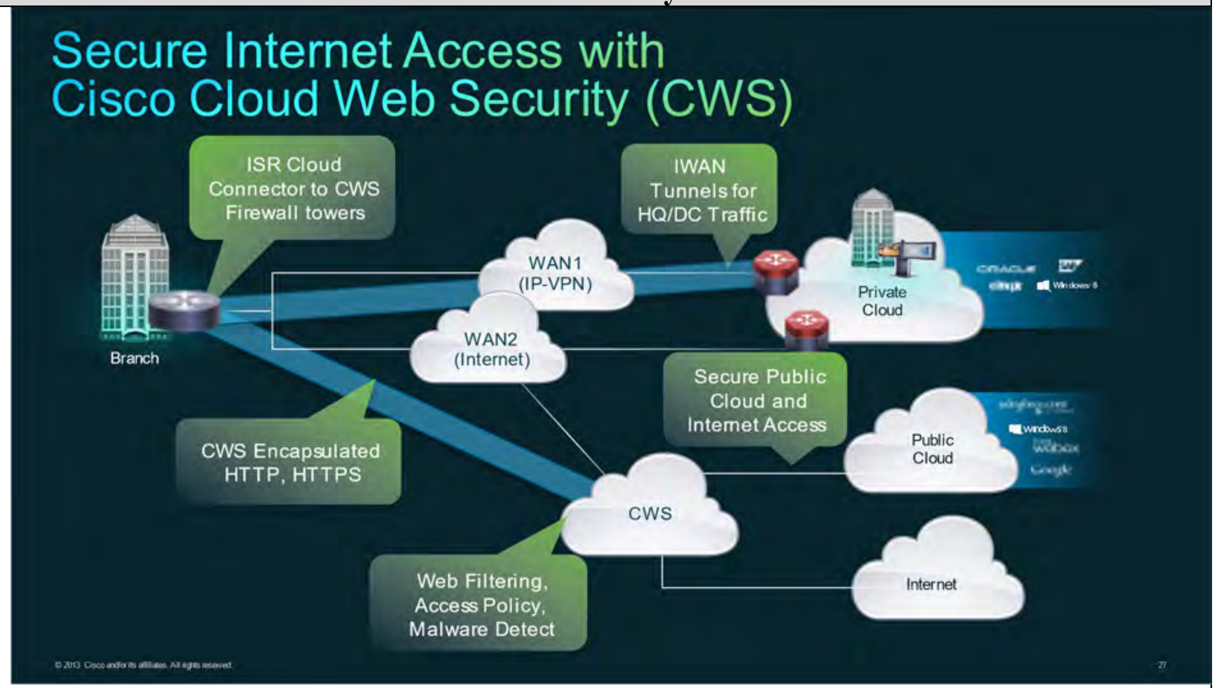
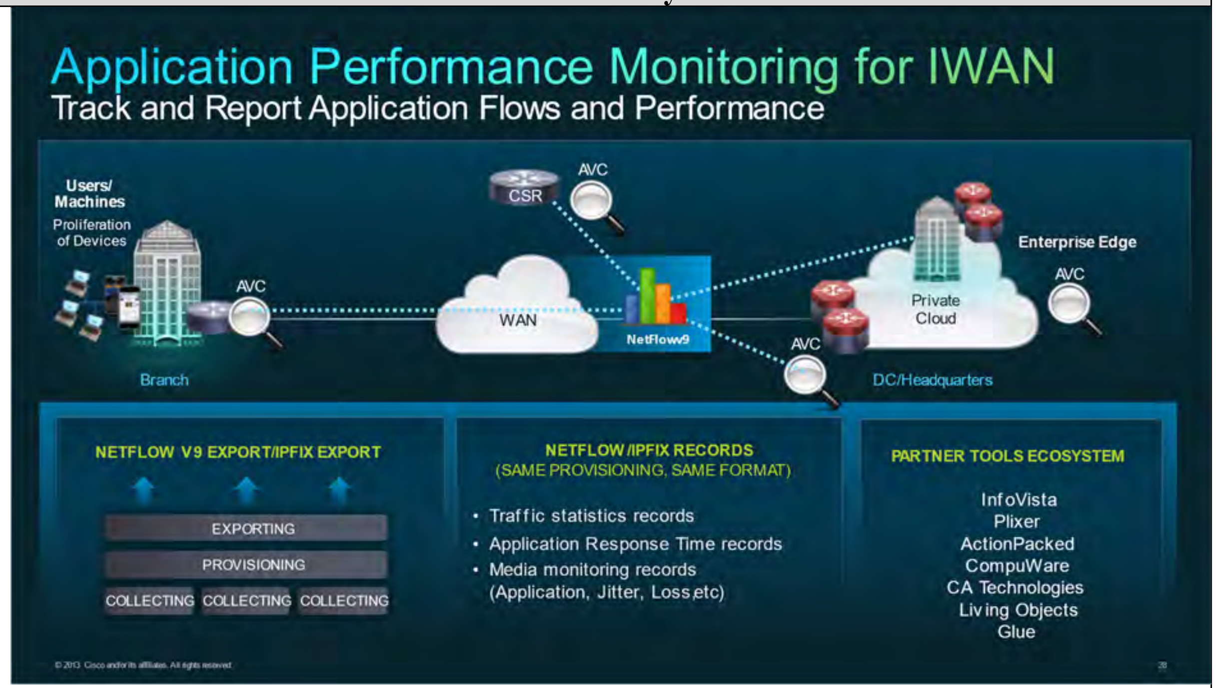
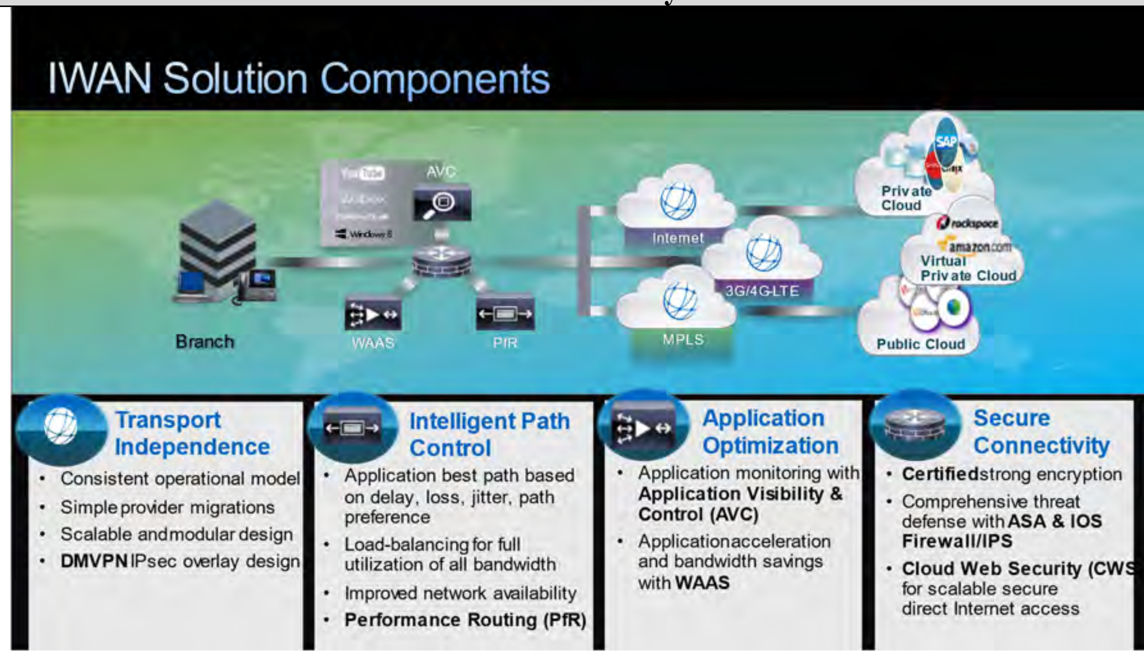
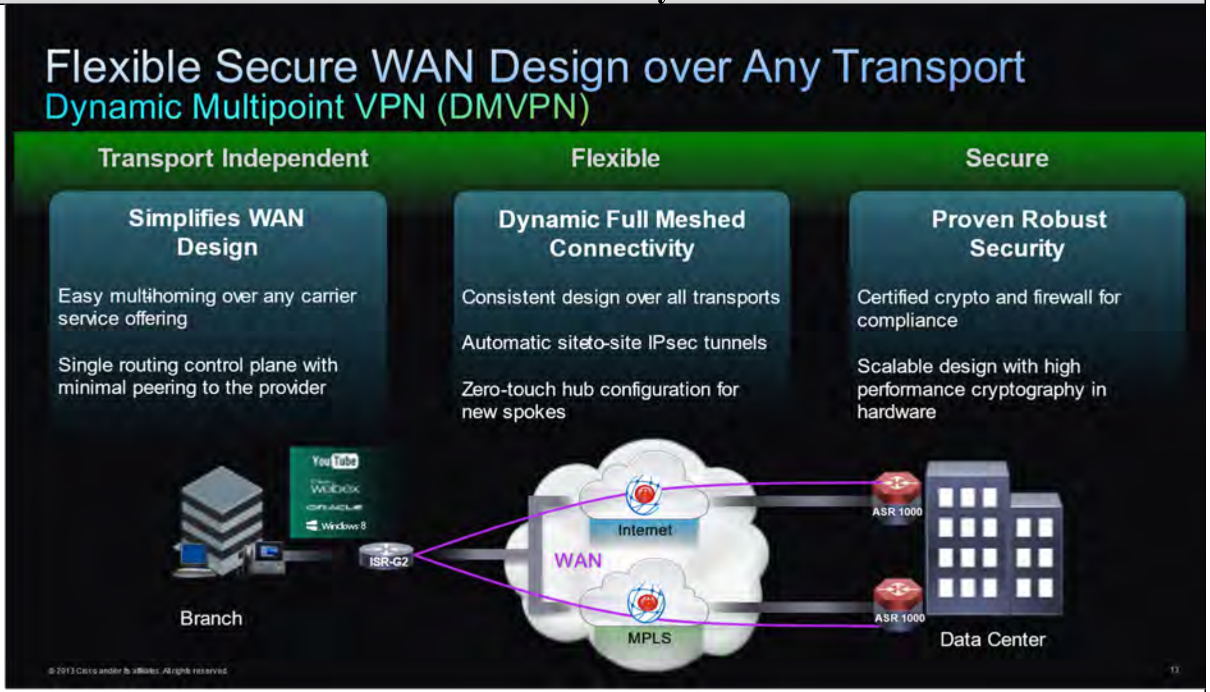
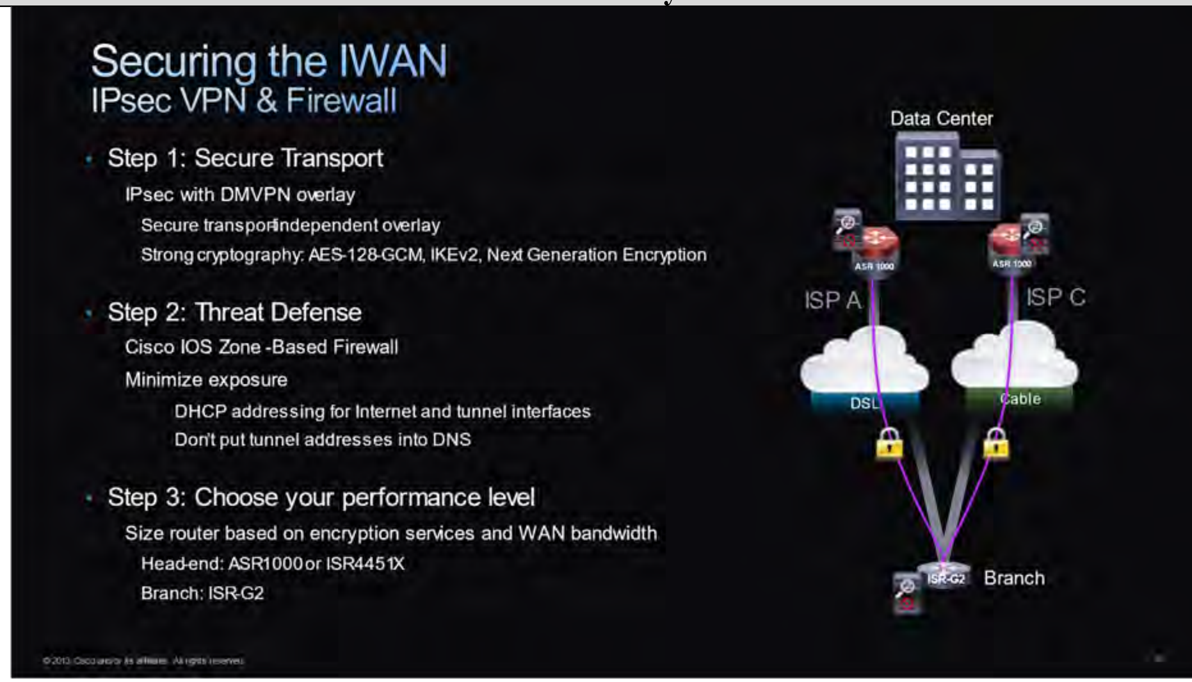
No.	’111 Patent Claim 13	Cisco IWAN System
		 Cisco Next Generation

No.	'111 Patent Claim 13	Cisco IWAN System
		 Cisco IWAN

No.	'111 Patent Claim 13	Cisco IWAN System
		 Cisco IWAN

No.	'111 Patent Claim 13	Cisco IWAN System
		 Cisco IWAN

No.	’111 Patent Claim 13	Cisco IWAN System
		

No.	’111 Patent Claim 13	Cisco IWAN System
		

<table>
<tr><th>No.</th><th>’111 Patent Claim 13</th><th>Cisco IWAN System</th></tr>
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Cisco IWAN - Uncompromised Experience
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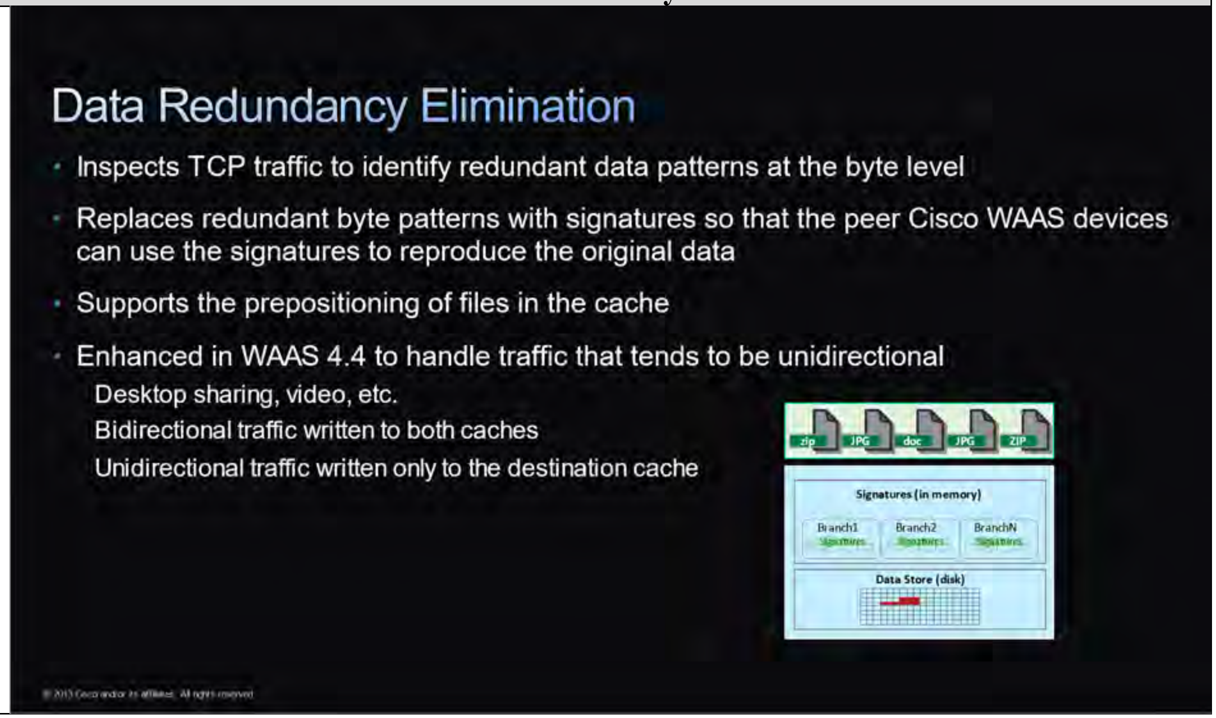
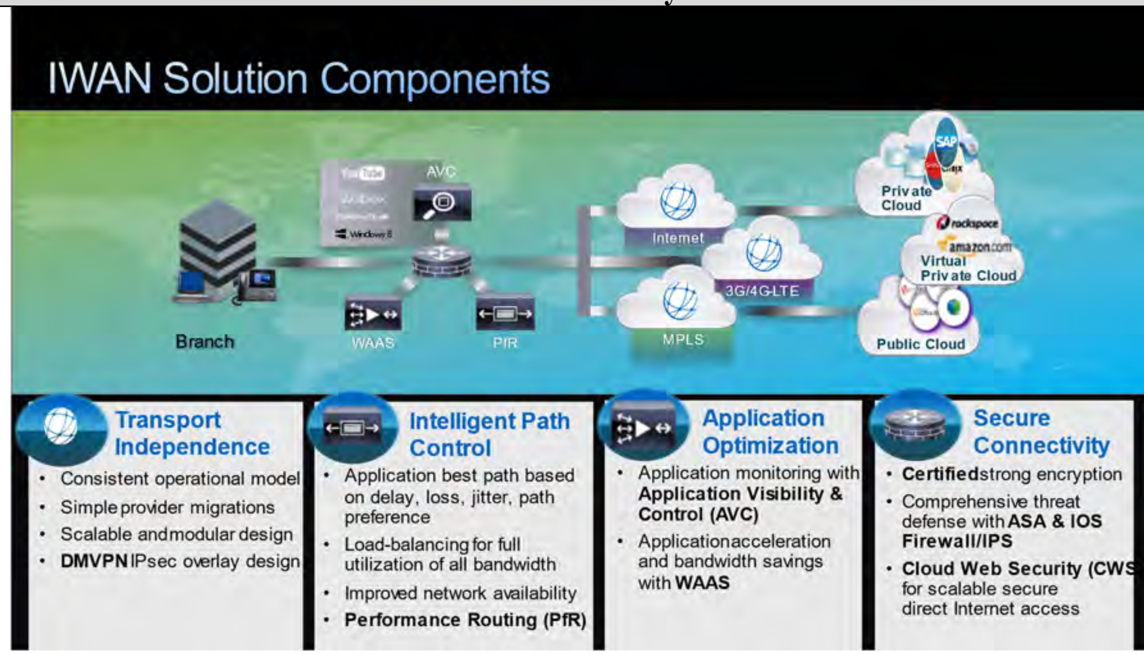
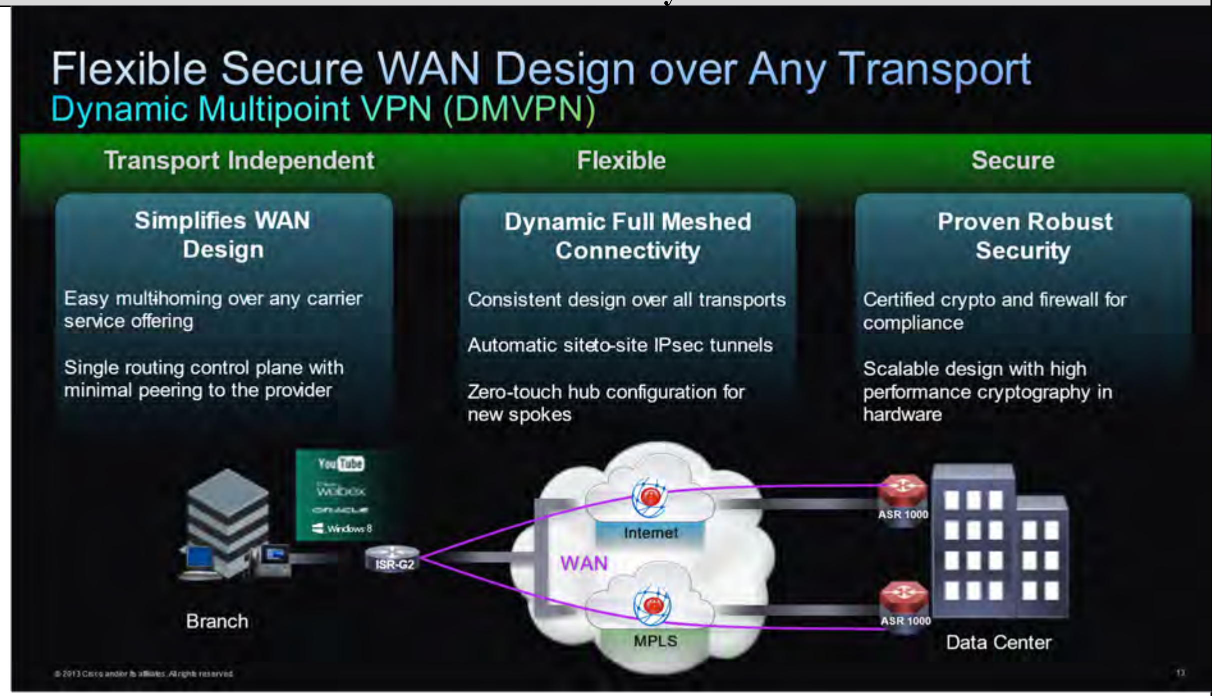
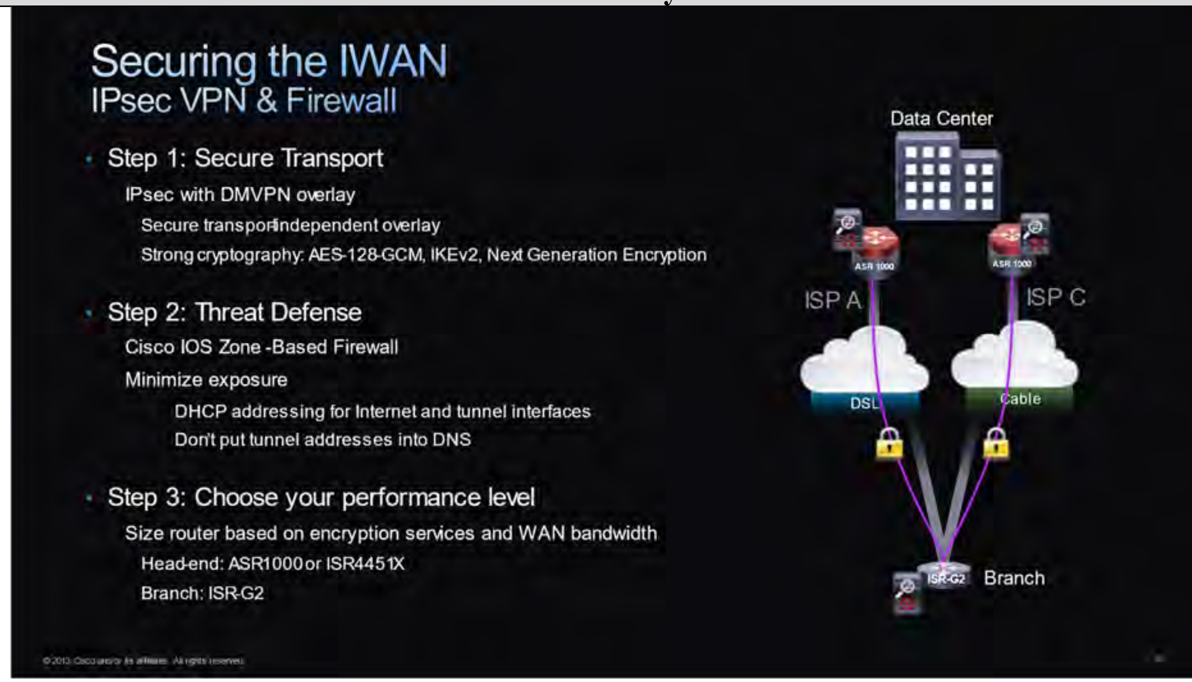
No.	’111 Patent Claim 13	Cisco IWAN System
		

No.	’111 Patent Claim 14	Cisco IWAN System
14	The method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet.	Cisco IWAN System discloses the method according to claim 9, wherein the analyzing comprises performing Deep Packet Inspection (DPI) or using a DPI engine on the packet. For example, Cisco IWAN System discloses analyzing traffic flow metrics with inspection functionality. *See supra* at Claim 9. Cisco IWAN

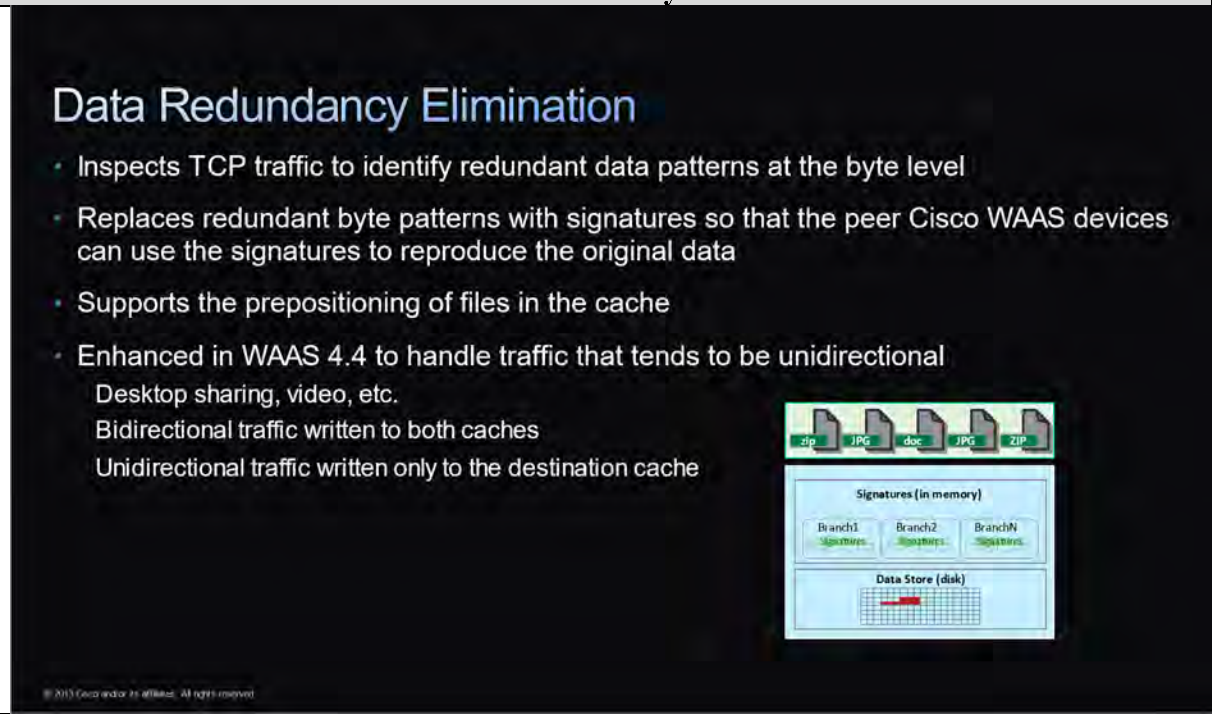
No.	’111 Patent Claim 14	Cisco IWAN System
		 Cisco IWAN

No.	'111 Patent Claim 14	Cisco IWAN System
		 Cisco IWAN

No.	’111 Patent Claim 14	Cisco IWAN System
		

No.	’111 Patent Claim 14	Cisco IWAN System
		

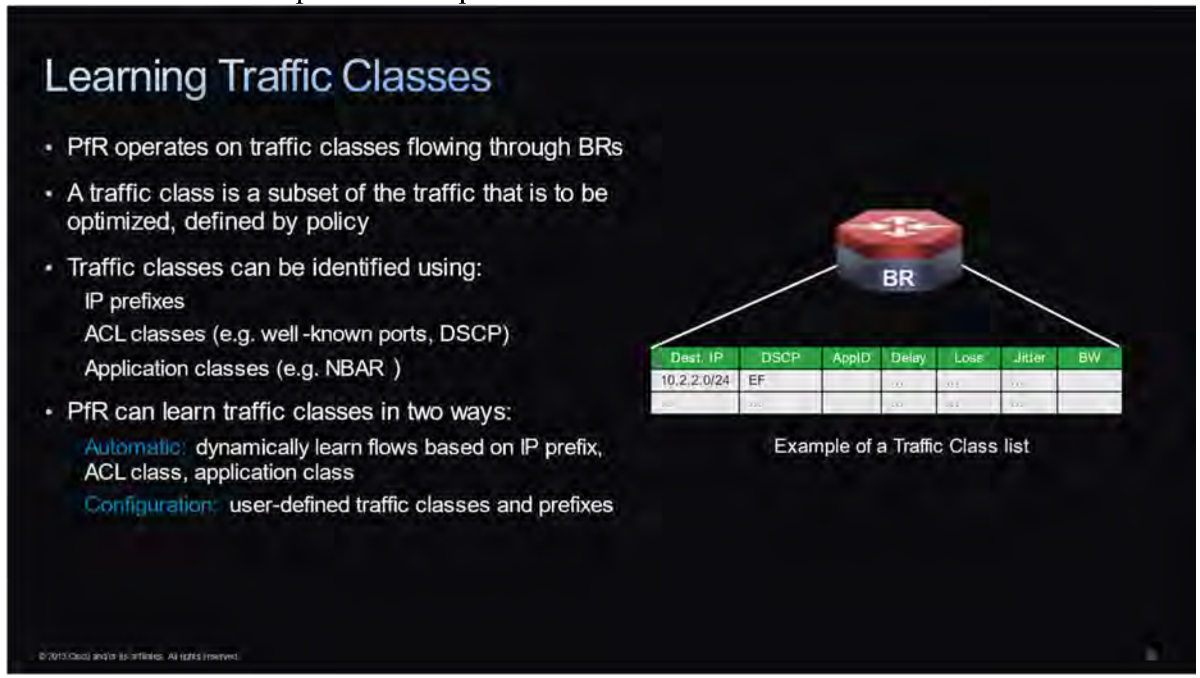
No.	’111 Patent Claim 14	Cisco IWAN System
		 Cisco IWAN - Uncompromised Experience

No.	’111 Patent Claim 14	Cisco IWAN System
		

No.	’111 Patent Claim 15	Cisco IWAN System
15[a]	The method according to claim 9, wherein the packet comprises distinct header and payload fields, and	Cisco IWAN System discloses the method according to claim 9, wherein the packet comprises distinct header and payload fields. For example, Cisco IWAN System discloses data traffic that can be defined into subsets by prefixes. A person of ordinary skill in the art would understand that data traffic is made up of packets comprised of header and payload fields. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, wherein the packet comprises distinct header and payload fields would have been obvious to a person having ordinary skill in the art, as explained below. *See supra* at Claim 9.

No.	’111 Patent Claim 15	Cisco IWAN System

Cisco IWAN - Uncompromised Experience



Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 15(a) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example.

For example, Swenson discloses packet flows with header and payload fields.

Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140

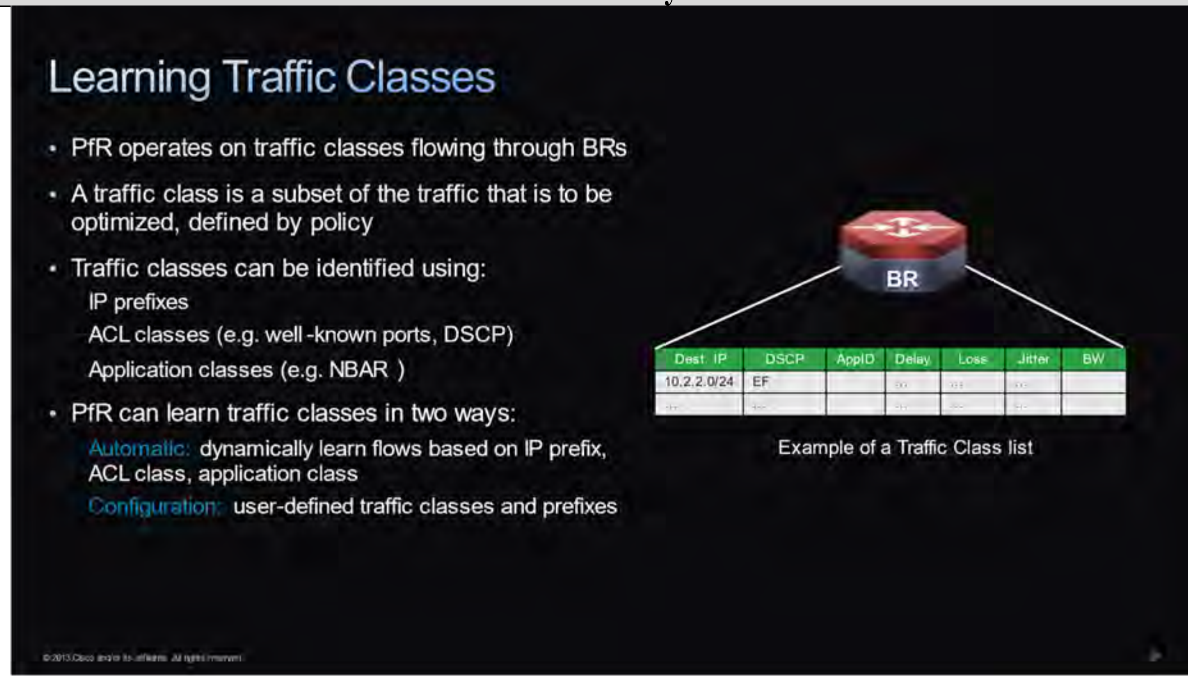
No.	'111 Patent Claim 15	Cisco IWAN System
		interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.") Swenson at [0040] ("The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.") Swenson at [0049] ("The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.") Swenson at [0061] ("Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the

No.	’111 Patent Claim 15	Cisco IWAN System
		network link 416 from the steering device 130 to the user device 110, the TCP congestion control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0064] (Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net- work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In

No.	’111 Patent Claim 15	Cisco IWAN System
		one embodiment, the steering device 130 for-wards the HTTP get request 512 to the intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.”) Swenson at [0069] (“FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.”) Swenson at [0073] (“FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in

No.	'111 Patent Claim 15	Cisco IWAN System
		the example diagram is a possible linked list behind each flow cache entry which allows chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.") Swenson at [0079] ("In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.") Swenson at [0083] ("When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains

No.	’111 Patent Claim 15	Cisco IWAN System
		identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)
15[b]	wherein the analyzing comprises checking part of, or whole of, the payload field.	Cisco IWAN System discloses wherein the analyzing comprises checking part of, or whole of, the payload field. For example, Cisco IWAN System discloses determining traffic classes by identifying traffic characteristics. A person of ordinary skill in the art would understand that one characteristic of data traffic that can be used to identify traffic class is the payload field. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, wherein the analyzing comprises checking part of, or whole of, the payload field would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN - Uncompromised Experience

No.	’111 Patent Claim 15	Cisco IWAN System
		 Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 15(b) of Exhibit E-4 renders the claim, including the present limitation, obvious. Below is an example. For example, Swenson discloses inspecting the payload of a packet flow. Swenson at [0026] (“The steering device 130 may be a load balancer or a router located between the user device 110 and the network 120. The steering device 130 provides the user device 110 with access to the network and thus, provides the gateway through which the user device traffic flows onto the network and vice versa. In one embodiment, the steering device 130 categorizes traffic routed through it to identify flows of inter-est for further inspection at the network controller 140. Alter-natively, the network controller 140 interfaces with the steer-ing device 130 to coordinate the monitoring and categorization of

No.	’111 Patent Claim 15	Cisco IWAN System
		network traffic, such as identifying large and small objects in HTTP traffic flows. In this case, the steering device 130 receives instructions from the network controller 140 based on the desired criteria for categorizing flows of interest for further inspection.”) Swenson at [0040] (“The flow analyzer 312 monitors large flows in the network, analyzes collected flow statistics to determine net-work throughput, and accordingly selects flows to be opti-mized. The flow analyzer 312 does not need to see all the flows in order to make an accurate estimate of network con-ditions. The flow analyzer 312 processes the traffic statistics stored in the flow cache 3 22 and user information stored in the subscriber log 324, for example, by associating network flows identified by source IP addresses to a mobile subscriber or user, which is identified by his or her current subscriber ID or device ID. The user flows are also mapped to a congestion level at the current sub-network (e.g., a cell with which the user devices are associated), so that an optimization decision can be made at the beginning of the data transmission.”) Swenson at [0049] (“The policy engine 314 defines policies for optimiz-ing large flows with media objects to mitigate network con-gestion. Detecting and acting on congestion in the network, the design focus of the network controller 140 is built on this very flexible policy engine. The policy engine 314 is capable of taking virtually any input, either deduced from HTTP headers and payload (e.g., through RADIUS/Gx interface), or provided by the network infrastructure via API, and making decisions on how to apply optimization based on individual or a combination of these inputs. The optimization policies can be applied to large flows all the time or on a time-of-day basis, a per user basis, and/or depending on the network condition.”) Swenson at [0061] (“Once a flow is reported to the network controller 140, a flow cache entry is created for the flow in the flow cache 322. The flow cache entry keeps track of the flow and its associated bandwidth. For a flow that is marked in "continue" mode, each time the steering device 130 forwards a next portion of the flow payload to the network controller 140, the flow cache 3 22 updates the number of bytes for transmitted in the flow. By monitoring the number of bytes per flow over time, the flow analyzer 312 is capable of determining an estimate value of bandwidth associated with flow. Further-more, since the steering device 130 does not have infinite packet buffers, if congestion happens on the network link 416 from the steering device 130 to the user device 110, the TCP congestion

No.	’111 Patent Claim 15	Cisco IWAN System
		control mechanism kicks in at the steering device 130, which may slows down and/or eventually stop receiving data over the network link 413 from origin server 160. During the congestion, the steering device 130 would not forward any data to the network controller 140, since the link 416 is congested and the network controller 140 would not be able to transmit data to the user device 110. Therefore, as an inline element, the network controller 140 can detect network con-gestions and estimate bandwidth associated with any flows of interest selected by the network controller 140. However, in the "continue" mode, the network controller 140 does not modify and transform the HTTP messaged it receives over the ICAP interface. The network controller 140 simply updates the flow statistics and returns the video or images to the steering device 130 for transmission to the user device 110.”) Swenson at [0064] (Similar to the "continue" mode, after receiving the initial HTTP messages of a flow and determining to monitor the flow, the network controller 140 notify the steering device 130 to work in a "counting" mode for bandwidth monitoring. In contrast to the "continue" mode, when a matching flow is detected for "counting" mode, the steering device 130 for-wards the HTTP response directly to the user device 110. While at the same time, the steering device 130 send a cus-tomized ICAP message to the network controller 140 over the network link 425. In one embodiment, the customized ICAP message contains the HTTP request and response headers, as well as a count of payload size of the current flow. After updating the flow statistics, the network controller 140 may acknowledge the gateway over the network line 426. In the "counting" mode, the network controller 140 does not join the network response path as an inline network element, but simply listens to the counting of flow size. The benefit of the "counting" mode is to off-load the network controller 140 from ingesting and forwarding the network flow on the net- work response path, while still enabling the detection of con-gestions and estimation of bandwidth associated with the flows of interest.”) Swenson at [0065] (“FIG. 5 is a block diagram illustrating an example event trace of "continue" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 512 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 512 to the

No.	'111 Patent Claim 15	Cisco IWAN System
		intended origin server 160 and receives a response 514 back from the origin server 160. The steering device 130 then sends an ICAP request message 516 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 518. Upon receiving the instruc-tion, the steering device 130 re-writes the response 514 to an HTTP redirect response 520, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 520 directly to the user device 110. In case the flow dose not contain video or image objects, or the network controller 140 determines not to monitor the flow, the steering device 13 0 would forward the response to the user device 110.") Swenson at [0069] ("FIG. 6 is a block diagram illustrating an example event trace of "counting" working mode between the user device 110, steering device 130, network controller 140, video optimizer 150, and origin server 160. The process starts when the user device 110 initiates an HTTP GET request 612 to retrieve content from the origin server 160. The steering device 130 intercepts all requests originated from the user device 110. In one embodiment, the steering device 130 for-wards the HTTP get request 612 to the intended origin server 160 and receives a response 614 back from the origin server 160. The steering device 130 then sends an ICAP request message 616 comprising the HTTP GET request header and a portion of the response payload to the network controller 140, which inspects the message to determine whether to monitor the flow or optimize the video. In this case, the network controller 140 responds with a redirect to optimize the video in ICAP response 618. Upon receiving the instruc-tion, the steering device 130 re-writes the response 614 to an HTTP redirect response 620, causing the user device 110 to request the video file from the video optimizer 150. In another embodiment, the network controller 140 sends the HTTP redirect request 620 directly to the user device 110. In case the flow dose not contain video or image objects that need to be redirected, the steering device 130 would forward the response to the user device 110.") Swenson at [0073] ("FIG. 7 is a block diagram illustrating one embodi-ment of an example of internal components of the flow cache. The flow cache map 700 comprises a plurality of flow cache entries, such as flow cache entries 710 and 712 indexed by a hash. Not shown in the example diagram is a possible linked list behind each flow cache entry which allows

No.	’111 Patent Claim 15	Cisco IWAN System
		chaining of flow cache entries for a given hash index. The hash into the flow cache may be based on source IP address, MAC address, subscriber ID, or other identifier indicative of a given sub-scriber, group of subscribers or subscriber's device.”) Swenson at [0079] (“In the bandwidth calculation, flows are categorized into buckets based on the size of the objects being transferred. Small objects may not be factored into the bandwidth calcu-lation since they may come and go within a single interval. For example, flows with payload size less than 50 kB may be ignored because a transfer of 50 kB may never reach the full potential throughput of the link. While larger flows may reach the full throughput of the link for a long period of time intervals, they are grouped into 50-75 kB, 75-100 kB and 100 kB+ buckets because the characteristics of these flow sizes can be different, hence the bandwidth for each of the buckets is measured and calculated separately. In other embodiments, the flow size ranges (e.g., 50-75 kB, 75-100 kB and l00kB+) of the buckets may be altered depending on the network traffic and size of objects transmitted. Furthermore, the bucket sizes can also be adjusted based on network topology, such as buffer size, prior to transmission to the client. The calculated bandwidth per bucket is stored in a queue structure that allows for the computing and updating of minimum, maximum, and/or average measurements for each bucket. In one embodiment, the 100 kB+ bucket's current tail entry is checked against the average bandwidth for the 100 kB+ bucket. If the current entry is less than the average multiplied by the number of entries in the queue, the current entry is added to the bandwidth calculation for the current interval. This scheme can filter out large bursts of data from tempo-rarily idle flows. If the bandwidth exceeds the value, a number of bytes (e.g., 125 kB) will be subtracted from the current entry to account for TCP buffers in the network.”) Swenson at [0083] (“When a new flow is observed, flow cache entries are searched by matching source IP address 722 if the subscriber id or other identifiers of the flow are not available. In case of multiple users sharing an IP address, the flow analyzer 312 needs to find patterns or other identifiers in the flows to map them to particular subscribers. Flows without identified sub-scribers are added to the flow cache block under the default user flows 726, which is a default holding place for the new flows. The flow analyzer 312 later will scan through the default user flows that contain cookies or other identifiers that may be used to determine a real user or subscriber associated with the flow. If a flow contains

No.	’111 Patent Claim 15	Cisco IWAN System
		identifiers not associated with an existing real user, a new user or subscriber is created and the user flow block is moved to newly created (or mapped) user or subscriber.”)

No.	’111 Patent Claim 16	Cisco IWAN System
16[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Cisco IWAN System discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
16[b]	the header comprises one or more flag bits, and	Cisco IWAN System discloses the header comprises one or more flag bits. On information and belief, the Cisco IWAN System discloses headers comprised of one or more flag bits. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, the header comprises one or more flag bits would have been obvious to a person having ordinary skill in the art, as explained below. Cisco IWAN - Uncompromised Experience

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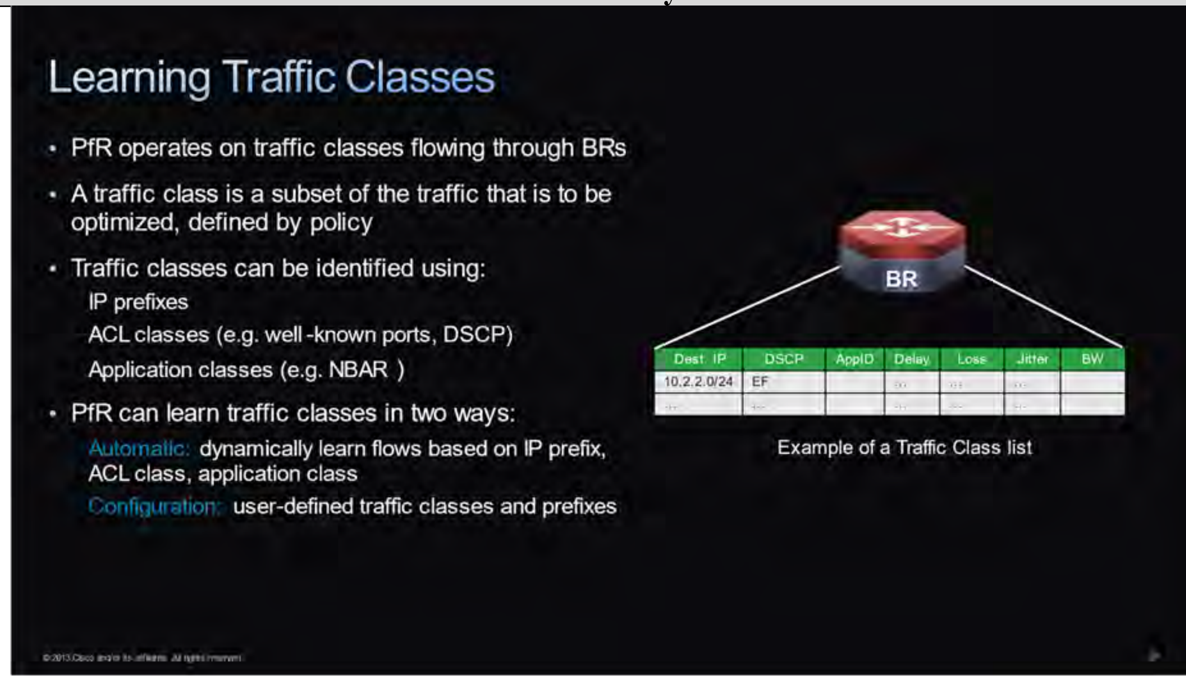
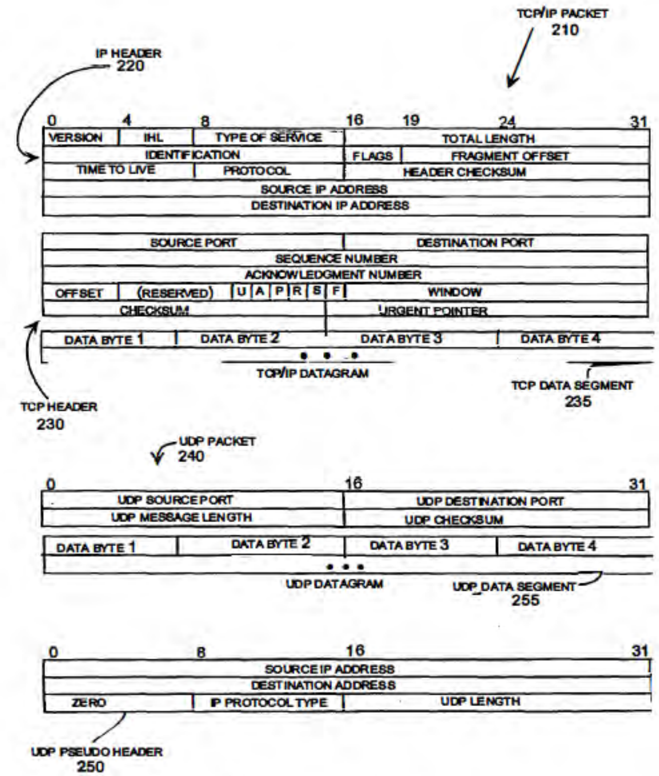


Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.

For example, Copeland discloses packet headers with flag bits.

Copeland at Figure 2

No.	'111 Patent Claim 16	Cisco IWAN System
		 PACKET HEADERS FIG. 2 Copeland at [0076] ("FIG. 2 illustrates an exemplary TCP/IP packet or datagram 210 and an exemplary UDP datagram 240. In a typical TCP/IP packet like 210, each packet typically includes a header portion comprising an IP header 220 and a TCP header 230, followed by a data portion that contains the information to be communicated in the packet. The information in the IP header 220 contained in a TCP/IP packet 210, or any other IP packet, contains the IP addresses and assures that the packet is delivered to the right host. The transport layer protocol (TCP) header follows the Internet protocol header and specifies the port numbers for the associated service.")

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		Copeland at [0077] (“The header portion in the typical TCP/IP datagram 210 is 40 bytes including 20 bytes of IP header 220 information and 20 bytes of TCP header 230 information. The data portion or segment associated with the packet 210 follows the header information.”) Copeland at [0078] (“In regards to a typical IP packet 210, the first 4 bits of the IP header 220 identify the Internet protocol (IP) version. The following 4 bits identify the IP header length in 32 bit words. The next 8 bits differentiate the type of service by describing how the packet should be handled in transit. The following 16 bits convey the total packet length.”) Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”)

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		Copeland at [0083] ("Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.") Copeland at [0116] ("These steps generally require manipulations of quantities such as IP addresses, packet length, header length, start times, end times, port numbers, and other packet related information. Usually, though not necessarily, these quanti-ties take the form of electrical, magnetic, or optical signals capable of being stored, transferred, combined, compared, or otherwise manipulated. It is conventional for those skilled in the art to refer to these signals as bits, bytes, words, values, elements, symbols, characters, terms, numbers, points, records, objects, images, files or the like. It should be kept in mind, however, that these and similar terms should be associated with appropriate quantities for computer opera-tions and that these terms are merely conventional labels applied to quantities that exist within and during operation of the computer.") As another example, Kempf discloses packet headers with flag bits. Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.") Kempf at [0082] ("In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway

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		can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.”) Kempf at [0083] (“If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.”) Kempf at [0088] (“To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.”) Kempf at [0092] (“In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header

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		flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.”) Kempf at [0094] (“In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).”) Kempf at [0098] (“The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”) Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if

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		the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_
		teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenFlow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		`struct ermst_gtp_mask {`
		`uint32_t gtp_wildcard;`
		`uint16_t gtp_flag_mask;`
		`};`
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)

16[c]	wherein the packet-applicable criterion is that one or more of the flag bits is set.	Cisco IWAN System discloses wherein the packet-applicable criterion is that one or more of the flag bits is set. On information and belief, the Cisco IWAN System discloses headers comprised of one or more flag bits. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, wherein the packet applicable criterion is that one or

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		more of the flag bits is set would have been obvious to a person having ordinary skill in the art, as explained below. Under at least the apparent claim scope alleged by Orckit's Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 16[c] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references. For example, Copeland discloses packet specific characteristics including flag bits that are set. Copeland at [0081] ("In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.") Copeland at [0082] ("Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.")

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		Copeland at [0083] ("Following the TCP flag bits is a 16-bit receive window size field that specifies the amount of space avail-able in the receive buffer for the TCP connection. The checksum of the TCP header is a 16-bit field. Following the checksum is a 16 bit urgent pointer that points to the urgent data. The TCP/IP datagram data follows the TCP header.") Copeland at [0089] ("FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.") Copeland at [0125] ("For purposes of the description, which follows, the IP address with the lower value, when considered as a 32-bit unsigned integer, is designated ip[0] and the corresponding port number is designated pt[0]. The higher IP address is designated ip[l] and the corresponding TCP or UDP port number is designated pt[l]. At some point, either pt[0] or pt[l] may be designated the "server" port by setting an appropriate bit in a bit map that is part of the flow record (record "state", bit 1 or 2 is set).") Copeland at [0145] ("A list IP of addresses contacted or probed by each host can be maintained. When this list indicates that more than a threshold number of other hosts (e.g., 8) have been contacted in the same subnet, CI is added to the to the host and a bit in the host record is set to indicate that the host has received CI for "address scanning." Note that the number of hosts to designate a scan is not required to be a fixed value, but could be adjusted based on the sample rate or other means to enhance the accuracy making the number of hosts scanned "statistically significant". These and other values of concern index are shown for non-flow based events in FIG. 7.") As another example, Kempf flow table matches in which the flag bits is set, Kempf at [0081] ("In one embodiment, OpenFlow is modified to pro-vide rules for GTP TEID Routing. FIG. 17 is a diagram of one embodiment of the OpenFlow flow table modification for GTP TEID routing. An OpenFlow switch that supports TEID routing matches on the 2 byte (16 bit) collection of header fields and the 4 byte (32 bit) GTP TEID, in addition to other OpenFlow header fields, in at least one flow table (e.g., the first flow

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		table). The GTP TEID flag can be wildcarded (i.e. matches are "don't care"). In one embodiment, the EPC pro-tocols do not assign any meaning to TEIDs other than as an endpoint identifier for tunnels, like ports in standard UDP/ TCP transport protocols. In other embodiments, the TEIDs can have a correlated meaning or semantics. The GTP header flags field can also be wildcarded, this can be partially matched by combining the following bitmasks: 0xFF00- Match the Message Type field; 0xe0-Match the Version field; 0xl0-Match the PT field; 0x04-Match the E field; 0x02- Match the S field; and 0x0l-Match the PN field.") Kempf at [0082] ("In one embodiment, OpenFlow can be modified to support virtual ports for fast path GTP TEID encapsulation and decapsulation. An OpenFlow mobile gateway can be used to support GTP encapsulation and decapsulation with virtual ports. The GTP encapsulation and decapsulation virtual ports can be used for fast encapsulation and decapsulation of user data packets within GTP-U tunnels, and can be designed simply enough that they can be implemented in hardware or firmware. For this reason, GTP virtual ports may have the following restrictions on traffic they will handle: Protocol Type (PT) field= 1, where GTP encapsulation ports only sup-port GTP, not GTP' (PT field=0); Extension Header flag (E)=0, where no extension headers are supported, Sequence Number flag (S)=0, where no sequence numbers are sup-ported; N-PDU flag (PN)=0; and Message type=255, where Only G-PDU messages, i.e. tunneled user data, is supported in the fast path.") Kempf at [0083] ("If a packet either needs encapsulation or arrives encapsulated with nonzero header flags, header extensions, and/or the GTP-U packet is not a G-PDU packet (i.e. it is a GTP-U control packet), the processing must proceed via the gateway's slow path (software) control plane. GTP-C and GTP' packets directed to the gateway's IP address are a result of mis-configuration and are in error. They must be sent to the OpenFlow controller, since these packets are handled by the S-GW-C and P-GW-C control plane entities in the cloud computing system or to the billing entity handling GTP' and not the S-GW-D and P-GW-D data plane switches.") Kempf at [0088] ("To support slow path encapsulation, the software control plane on the switch maintains a hash table with keys calculated from the GTP-U TEID. The TEID hash keys are calculated using a suitable hash algorithm with low collision frequency, for

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		example SHA-1. The flow table entries contain a record of how the packet header, including the GTP encap-sulation header, should be configured. This includes: the same header fields as for the hardware or firmware encapsu-lation table in FIG.18; values for the GTP header flags (PT, E, S, and PN); the sequence number and/or the N-PDU number if any; if the E flag is 1, then the flow table contains a list of the extension headers, including their types, which the slow path should insert into the GTP header.") Kempf at [0092] ("In one embodiment, the system implements a GTP fast path decapsulation virtual port. When requested by the S-GW and P-GW control plane software running in the cloud computing system, the gateway switch installs rules and actions for routing GTP encapsulated packets out of GTP tunnels. The rules match the GTP header flags and the GTP TEID for the packet, in the modified OpenFlow flow table shown in FIG. 17 as follows: the IP destination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); and the header fields and message type field is wildcarded with the flag 0XFFF0 and the upper two bytes of the field match the G-PDU message type (255) while the lower two bytes match 0x30, i.e. the packet is a GTP packet not a GTP' packet and the version number is 1.") Kempf at [0094] ("In one embodiment, the system implements han-dling of GTP-U control packets. The OpenFlow controller programs the gateway switch flow tables with 5 rules for each gateway switch IP address used for GTP traffic. These rules contain specified values for the following fields: the IP des-tination address is an IP address on which the gateway is expecting GTP traffic; the IP protocol type is UDP (17); the UDP destination port is the GTP-U destination port (2152); the GTP header flags and message type field is wildcarded with 0xFFF0; the value of the header flags field is 0x30, i.e. the version number is 1 and the PT field is 1; and the value of the message type field is one of 1 (Echo Request), 2 (Echo Response), 26 (Error Indication), 31 (Support for Extension Headers Notification), or 254 (End Marker).") Kempf at [0098] ("The header flags and message type fields for the three rules are wildcarded with the following bitmasks and match as follows: bitmask 0xFFF4 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are Ox34, indicating that the version number is 1, the packet is a GTP packet, and there is an extension

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		header present; bitmask 0xFFFF2 and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x32, indicating that the version number is 1, the packet is a GTP packet, and there is a sequence number present; and bitmask 0xFF0l and the upper two bytes match the G-PDU message type (255) while the lower two bytes are 0x31, indicating that the version number is 1, the packet is a GTP packet, and a N-PDU is present.”)
		
		Kempf at [0114] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GTP TEID. The gtp_ wildcard field indicates whether the GTP type and flags and TEID should be matched. If the lower four bits are 1, the type and flags field should be ignored, while if the upper four bits are 1, the TEID should be ignored. If the lower bits are 0, the type and fields flag should be matched subject to the flags in the gtp_flag_mask field, while if the upper bits are 0 the TEID should be matched. The mask is combined with the message type and header field of the packet using logical AND; the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”)
		
		Kempf at [0117] (“The gtp_type_n_flags field contains the GTP mes-sage type in the upper 8 bits and the GTP header flags in the lower 8 bits. The gtp_teid field contains the GRP TEID. When the value of the oxm_type (oxm_class+oxm_field is GTP _ MATCH and the HM bit is zero, the flaw's GTP header must match these values exactly. If the HM flag is one, the value contains an ersmt_gtp_match field and an ermst_gtp_mask field, as specified by the OpenF!ow 1.2 specification. We define ermst_gtp_mask field for selecting flows based on the settings of flag bits:
		
		struct ermst_gtp_mask {
		uint32_t gtp_wildcard;
		uint16_t gtp_flag_mask;
		};
		
		Kempf at [0118] (“The gtp_ wildcard field indicates whether the TEID should be matched. If the value is 0xFFFFFFFF, the TEID should be matched and not the flags, if the value is 0x00000000, the flags should be matched and not the TEID. If the gtp_ wildcard indicates

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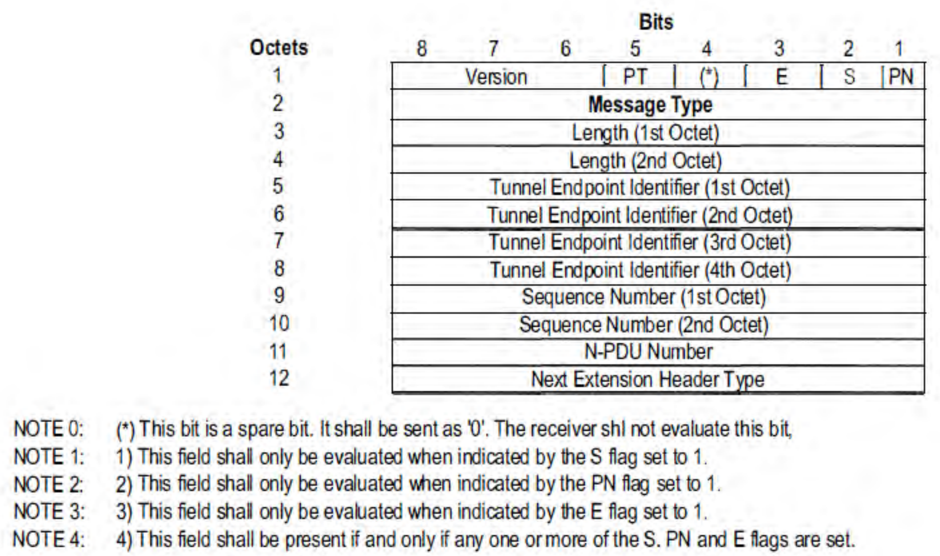
		the flags should be matched, the gtp_flag_mask is combined with the message type and header field of the packet using logical AND, the result becomes the value of the match. Only those parts of the field in which the mask has a 1 value are matched.”) Kempf at Figure 10  FIG. 10

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17[a]	The method according to claim 16, wherein the packet is an Transmission Control	Cisco IWAN System discloses the method according to claim 16, wherein the packet is an Transmission Control Protocol (TCP) packet. For example, Cisco IWAN System discloses traffic flows that are part of a TCP connection.

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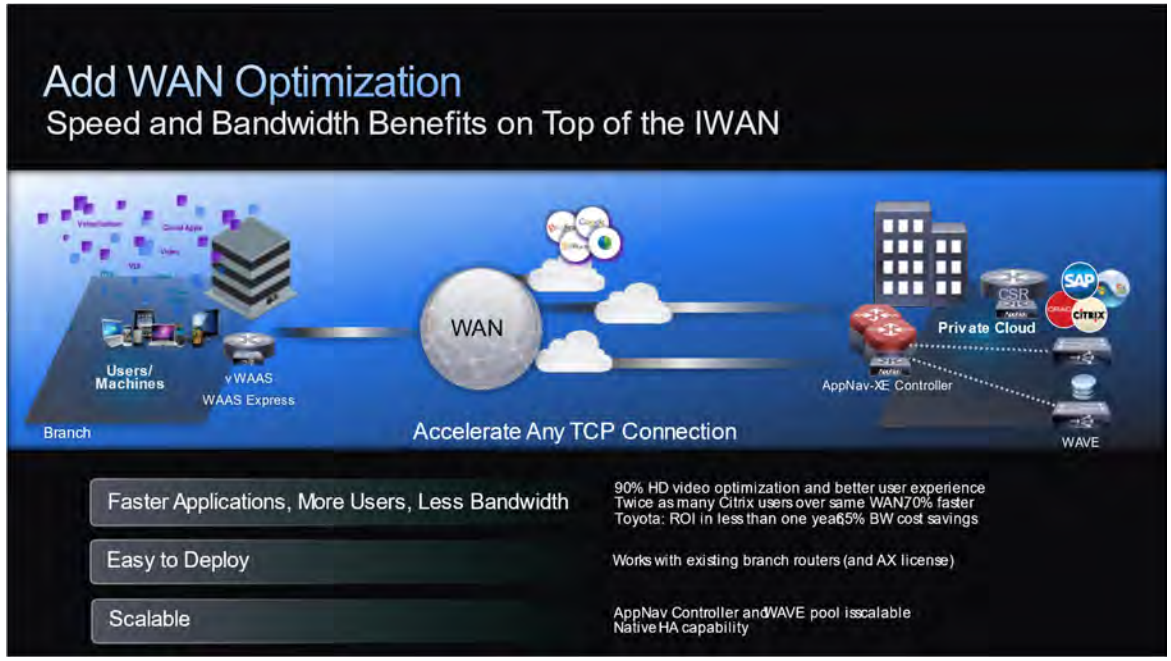
	Protocol (TCP) packet, and	*See supra* at Claim 16. Cisco IWAN  Cisco IWAN - Uncompromised Experience

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		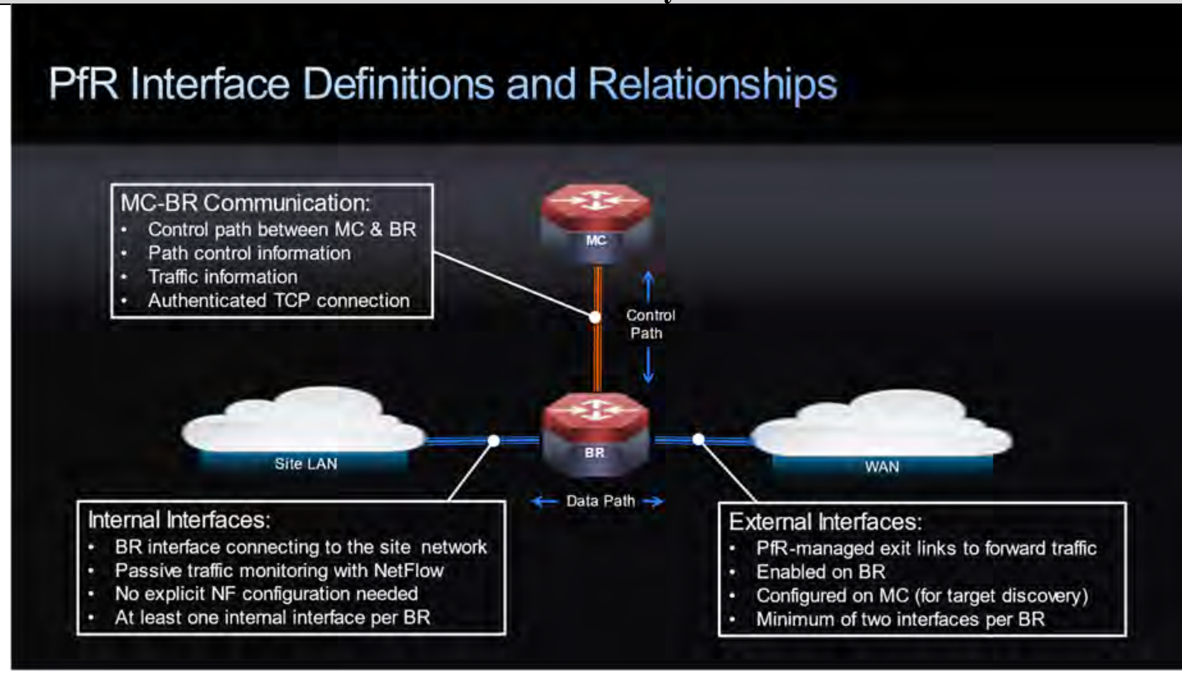

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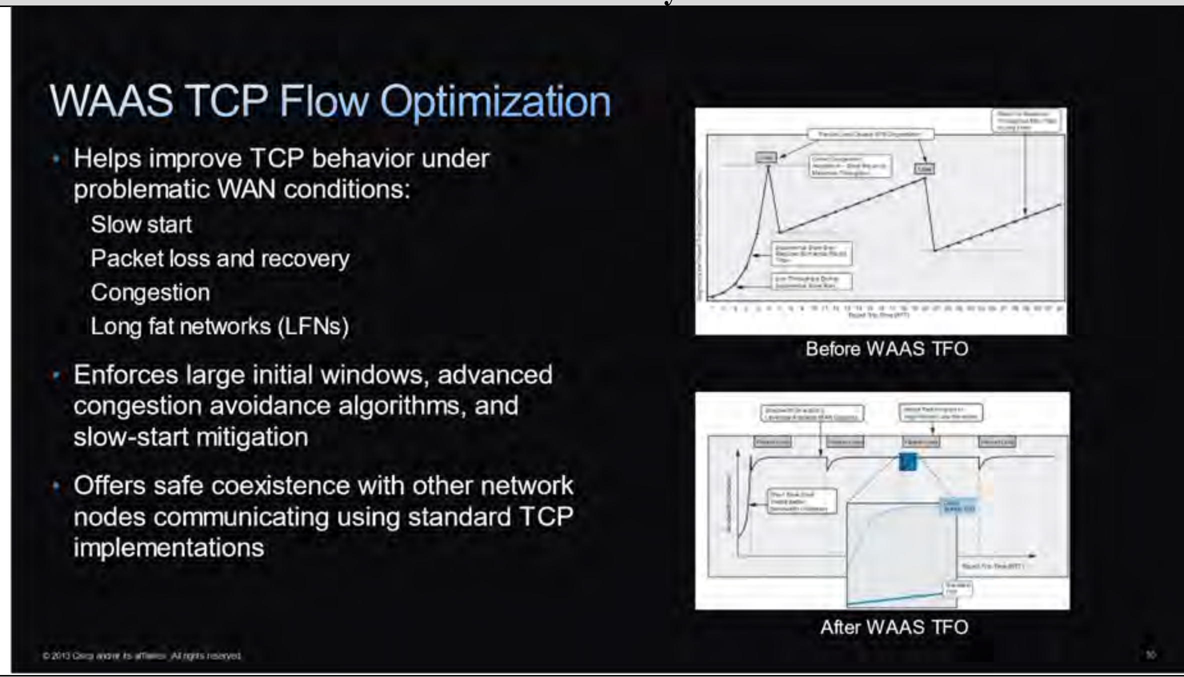
<tr><th>No.</th><th>’111 Patent Claim 17</th><th>Cisco IWAN System</th></tr>
<tr><td></td><td></td><td>
</td></tr>
<tr><td>17[b]</td><td>wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof.</td><td>On information and belief, the Cisco IWAN System discloses wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof. Thus, at least under the apparent claim scope alleged by Orckit’s Infringement Disclosures, this limitation is met. To the extent that the Cisco IWAN System is found to not meet this limitation, wherein the one or more flag bits comprises comprise a SYN flag bit, an ACK flag bit, a FIN flag bit, a RST flag bit, or any combination thereof would have been obvious to a person having ordinary skill in the art, as explained below.

Under at least the apparent claim scope alleged by Orckit’s Infringement Disclosures, Cisco IWAN System in combination with (1) the knowledge of a person of ordinary skill in the art, alone or in further combination with (2) each (individually, as well as one or more together) of the references identified in element 17[b] of Exhibit E-4 renders the claim, including the present limitation, obvious. Below are examples of two such references.</td></tr>
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		For example, Copeland discloses TCP packets with flag bits including SYN, ACK, FIN, and R flag bits. Copeland at [0081] (“In a TCP/IP datagram 210, the initial data of the IP datagram is the TCP header 230 information. The initial TCP header 230 information includes the 16-bit source and 16-bit destination port numbers. A 32-bit sequence number for the data in the packet follows the port numbers. Following the sequence number is a 32-bit acknowledgement number. If an ACK flag (discussed below) is set, this number is the next sequence number the sender of the packet expects to receive. Next is a 4-bit data offset, which is the number of 32-bit words in the TCP header. A 6-bit reserved field follows.”) Copeland at [0082] (“Following the reserved field, the next 6 bits are a series of one-bit flags, shown in FIG. 2 as flags U, A, P, R, S, F. The first flag is the urgent flag (U). If the U flag is set, it indicates that the urgent pointer is valid and points to urgent data that should be acted upon as soon as possible. The next flag is the A (or ACK or "acknowledgment") flag. The ACK flag indicates that an acknowledgment number is valid, and acknowledges that data has been received. The next flag, the push (P) flag, tells the receiving end to push all buffered data to the receiving application. The reset (R) flag is the following flag, which terminates both ends of the TCP connection. Next, the S (or SYN for "synchronize") flag is set in the initial packet of a TCP connection where both ends have to synchronize their TCP buffers. Following the SYN flag is the F (for FIN or "finish") flag. This flag signifies that the sending end of the communication and the host will not send any more data but still may acknowledge data that is received.”) Copeland at [0089] (“FIG. 3 illustrates an exemplary TCP/IP session 300. As discussed in reference to FIG. 2, the SYN flag is set whenever one host initiates a session with another host. In the initial packet, Hostl sends a message with only the SYN flag set. The SYN flag is designed to establish a TCP connection and allow both ends to synchronize their TCP buffers. Hostl provides the sequence of the first data packet it will send.”) Copeland at [0090] (“Host2 responds with a SYN-ACK packet. In this message, both the SYN flag and the ACK flag are set. Host2 provides the initial sequence number for its data to Hostl. Host2 also sends to Hostl the acknowledgment number that is the next sequence number Host2 expects to receive from host 1. In the SYN-ACK packet sent by Host2, the

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		acknowl-edgment number is the initial sequence number of Hostl plus 1, which should be the next sequence number received.”) Copeland at [0091] (“Hostl responds to the SYN-ACK with a packet with just the ACK flag set. Hostl acknowledges that the next packet of information received from Host2 will be Host2's initial sequence number plus 1. The three-way handshake is complete and data is transferred.”) Copeland at [0092] (“Host2 responds to ACK packet with its own ACK packet. Host2 acknowledges the data it has received from Hostl by sending an acknowledgment number one greater than its last received data sequence number. Both hosts send packets with the ACK flag set until the session is to end although the P and U flags may also be set, if warranted.”) Copeland at [0093] (“As illustrated, when Hostl terminates its end of the session, it sends a packet with the FIN and ACK flags set. The FIN flag informs Host2 that Hostl will send no more data. The ACK flag acknowledges the last data received by Hostl by informing Host2 of the next sequence number it expects to receive.”) Copeland at [0094] (“Host2 acknowledges the FIN packet by sending its own ACK packet. The ACK packet has the acknowledge-ment number one greater than the sequence number of Hostl's FIN-ACK packet. ACK packets are still delivered between the two hosts, except that HOSTl's packets have no data appended to the TCP/IP end of the headers.”) Copeland at [0095] (“When Host 2 is ready to terminate the session, it sends its own packet with the FIN and ACK flags set. Hostl responds that it has received the final packet with an ACK packet providing to Host2 an acknowledgment number one greater than the sequence number provided in the FIN-ACK packet of Host2.”) As another example, Uchida discloses the TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag. Uchida at [0040] (“A flow end can be detected by various methods as below. For example, in one method, a protocol end message is checked. For example, in the TCP (Transmission

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		Control Protocol), a FIN flag is checked. In this way, the end of communication, that is, the end of a flow using communica-tion, can be detected. In practice, after a FIN flag, communi-cation with an ACK packet is generated in a reverse-direction flow (a flow in which the source and the destination are reversed). Thus, by detecting the ACK flag in the reverse-direction flow after the FIN packet, a flow end can be deter-mined. Further, since the TCP is used in bidirectional com-munication, the forward- and reverse-direction flows can be used as a pair to determine a flow end. Namely, if the end of a flow is detected, a process rule corresponding to the reverse-direction flow of the flow can also be determined to be unnec-essary. Alternatively, a communication end can also be deter-mined when a predetermined time elapses after reception of a SYN packet and a timeout is determined. Still alternatively, a communication end can be determined by reception of a RST packet. These methods will be described in more detail later as specific examples.") Uchida at [0050] ("The flow end check unit can use at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag extracted by the end determination information extraction unit to determine a flow end.") Uchida at [0055] ("In the process rule update method, a flow end can be determined by at least one of a TCP (Transmission Control Protocol) FIN flag, RST flag, and SYN flag.") Uchida at [0102] ("Next, specific examples 1 to 3 will be described. In the examples 1 to 3, a flow end is determined by combining features of the above individual exemplary embodiments and using TCP (Transmission Control Protocol) flags.") Uchida at [0103] ("FIG. 6 is a state transition diagram of TCP connec-tion. "CLOSED" at the top of FIG. 6 represents the end of TCP communication, and portions connected thereto repre-sent states prior to the end of TCP communication. Approxi-mately 2MSL (MSL: Maximum Segment Lifetime) is the maximum amount of time required to reach the above "CLOSED," that is, if the packet forwarding apparatus stands by for approximately 2MSL after both FINs flow, the above "CLOSED" is reached. Thus, after a FIN is confirmed in either direction, if this 2MSL elapses, basically, a communi-cation end can be determined. Even if the state does not change smoothly because of packet loss or the like (for example, even if an ACK packet does not arrive after "CLOS-ING"), a retransmitted packet is forwarded immediately after this 2MSL. Thus, the end of TCP communication can be

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		determined if a new FIN packet is not received within the time corresponding to the 2MSL and a margin (2MSL+a) at long-est.”) Uchida at [0104] (“Hereinafter, the description will be made, assuming that a packet forwarding apparatus Cl according to the present invention relays TCP communication between a com-puter (client) Dl 0 and a server D20 that use network configu-rations illustrated in FIG. 7. In the example of FIG. 7, the computer Dl0 belongs to a network represented by 192.168. 0./24 and is set by 192.168.0.10. The server D20 belongs to a network represented by 192.168.1./24 and is set by 192.168. 1.10. As in the case of the OpenFlow controller described in Non-Patent Documents 1 and 2, a control apparatus (control-ler) Dl is connected to the packet forwarding apparatus Cl via a dedicated channel and manages connection between the two networks. In the following description, the control appa-ratus (controller) Dl controls the packet forwarding appara-tus Cl so that connection from other networks appears as communication from network number 1 (192.168.1.1) of the respective networks (see process rule actions in FIG. 19). In addition, in the present specific example, since FIN packets are monitored, the end determination information extraction unit Cl 7 monitors a protocol stack, including: fields in which the TCP is determined; and the FIN flag in the TCP header.”) Uchida at [0105] (“FIG. 8 is a flow chart of a flow end determination process using FIN flags. In FIG. 8, steps relating to a timeout determination are added to steps Slll to S116 in the flow chart in FIG. 3. Thus, the flow chart in FIG. 8 includes more detailed steps than the flow chart of FIG. 3. Hereinafter, operations will be described with reference to FIGS. 3, 6, and 8 and FIGS. 9 to 13. In practice, prior to TCP/IP communi-cation, ARP (Address Resolution Protocol) communication is executed, and a process rule may be set in that stage. However, for ease of description, description of the ARP communication will be omitted. The following description will be made based on communication at the TCP/IP level.”) Uchida at [0106] (“First, the computer Dl0 starts communication with the server D20. For an initial establishment of communica-tion, a packet (SYN) is inputted to the packet forwarding apparatus Cl (start of ACTIVE OPEN through SYN forward-ing in FIG. 6). The packet reception unit Cl0 receives and stores this first packet in the packet storage unit Cll (steps SlOl to S102 in FIG. 3).”)

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		Uchida at [0107] (“The packet reception unit C10 notifies the packet process information extraction unit C12 and the end determination information extraction unit C17 of reception of the packet. The packet process information extraction unit C12 refers to the packet storage unit C11 and extracts information such as IP source and destination information that is necessary to search for a process rule (step S103 in FIG. 3). Hereinafter, a process corresponding to steps S103 to S110 in FIG. 3 will be executed.”) Uchida at [0115] (“Upon receiving a notification that the packet has been received by the packet reception unit Cl 0, the end deter-mination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN flag (step S201 in FIG. 8).”) Uchida at [0116] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 1; the source address is 192.168. 0.10; the destination is 192.168.1.10; and the protocol is TCP (the type is Ox0006)) and stands by until forwarding of the packet. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a process rule to be deleted from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a process rule to be deleted represents that the source address is 192.168.1.1; the destination is 192.168.1.1 0; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”) Uchida at [0117] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0121] (“Next, after an ACK reply in response to the FIN packet from the computer DlO is forwarded from the server D20 in the same way as the above normal

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		packet (start of PASSIVE CLOSE in FIG. 6), the server D20 transmits a FIN packet to the computer DlO. When this FIN packet is inputted to the packet forwarding apparatus Cl, the flow end determi-nation process from steps Slll to S116 is started, as in the case of the above start of ACTIVE CLOSE.”) Uchida at [0122] (“Upon receiving a notification that the packet has been received from the packet reception unit Cl0, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP FIN flag, and finds a FIN packet (step S201 in FIG. 8).”) Uchida at [0123] (“Since a FIN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for identifying a modified process rule represents that the source address is 192.168.1. 10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extrac-tion unit Cl 7 notifies the flow end check unit C18 of the notification that the FIN packet has been received and these items of information (step S202 in FIG. 8).”) Uchida at [0124] (“Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether or not a FIN flag is set in a predetermined packet header position (step S203 in FIG. 8). These steps correspond to steps Slll to S114 in FIG. 3.”) Uchida at [0125] (“At this point, since a FIN packet has been transmit-ted, the flow end check unit C18 uses the information for identifying a process rule to be deleted as a key, extracts the process rule (process rule corresponding to ingress port 2 in FIG. 11) from the process rule storage unit C13, and marks a FIN packet reception flag (steps S204 to S205 in

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		FIG. 8). This process corresponds to the internal state update process in step S115 in FIG. 3.”) Uchida at [0134] (“Referring back to the state transition diagram of TCP connection in FIG. 6, there are two cases where "CLOSED" at the top of FIG. 6 is reached without a state transition involving FIN flags. One case arises when the ses-sion is closed from SYN_SENT, which is reached when a SYN packet in which a SYN flag is marked is transmitted. The other case arises when a timeout is generated. In such case, while the packet forwarding apparatus cannot monitor the closed session, the packet forwarding apparatus can con-firm a timeout in the following way. In the present specific example, a flow end is determined by this timeout.”) Uchida at [0135] (“n the present specific example, if a SYN/ ACK packet does not flow in a direction opposite to the SYN packet flow direction within a predetermined time (from "SYN_ RCVD" to "SYN_SENT" in FIG. 6), a timeout is determined.”) Uchida at [0136] (“FIG. 14 is a flow chart illustrating a flow end deter-mination process using a SYN flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the dif-ference.”) Uchida at [0137] (“In FIG. 14, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage, unit Cll, monitors a TCP SYN flag, and finds a SYN packet (step S301 in FIG. 14).”) Uchida at [0138] (“Since a SYN flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168. 1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox.0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted by the packet forwarding unit C16, the end deter-mination information extraction unit Cl 7 further extracts information for identifying a modified process rule from the packet storage unit Cll. Since the IP address is replaced, the extracted information for

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		identifying a process rule repre-sents that the source address is 192.168.1.10; the destination is 192.168.0.10; and the protocol is TCP (the type is 0x0006). The information is used for marking of the reverse flow. The end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the SYN packet has been received and these items of information (step S302 in FIG. 14).") Uchida at [0139] ("Upon receiving the above information from the end determination information extraction unit Cl 7, the flow end check unit C18 checks whether a SYN flag is set in a prede-termined packet header position and an ACK flag is not marked (step S303 in FIG. 14). These steps correspond to steps Slll to S114 in FIG. 3.") Uchida at [0148] (" Next, a third specific example in which a flow end determination is executed by using a TCP RST (reset) flag will be described.") Uchida at [0149] ("Referring back to the state transition diagram of TCP connection in FIG. 6, there is a transition from "SYN_ RCVD," which is a communication establishment standby state, to "LISTEN," which is a communication standby state. A TCP RST (reset) flag signifies release of connection and retry of communication. Namely, since a RST packet in which this RST flag is set signifies invalidation of communi-cation, by detecting this RST flag, a flow end can be deter-mined.") Uchida at [0150] ("FIG. 16 is a first flow chart illustrating a flow end determination process using a RST flag. Since the basic operations are the same as those of the above specific example 1, the following description will be made with a focus on the difference.") Uchida at [0151] ("In FIG. 16, upon receiving a notification that the packet has been received by the packet reception unit ClO, the end determination information extraction unit Cl 7 refers to the packet storage unit Cll, monitors a TCP RST flag, and finds a RST packet (step S401 in FIG. 16).") Uchida at [0152] ("Since a RST flag is set, the end determination infor-mation extraction unit Cl 7 determines that the packet includes information necessary for determining a flow end. Thus, the end determination information extraction unit Cl 7 extracts information for identifying a process rule to be deleted (the ingress port is 2; the source address is 192.168.

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		1.10; the destination is 192.168.1.1; and the protocol is TCP (the type is Ox0006)) and stands by until the packet is trans-mitted. Upon receiving a notification that the packet has been transmitted from the packet forwarding unit C16, the end determination information extraction unit Cl 7 notifies the flow end check unit C18 of the notification that the RST packet has been received and these items of information (step S402 in FIG. 16).") Uchida at [0164] ("For example, in a specific example of the present invention, certain TCP flags are monitored. A single packet forwarding apparatus can monitor these flags in a parallel fashion. For example, after a packet that triggers a flow end is detected, the above process may be allowed to branch to the above FIGS. 8, 14, and 16 (17) to realize parallel monitoring.")

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18[a]	The method according to claim 1, wherein the packet comprises distinct header and payload fields,	Cisco IWAN System discloses the method according to claim 1, wherein the packet comprises distinct header and payload fields. *See supra* at Claim 1, 15[a].
18[b]	the header comprises at least the first and second entities addresses in the packet network, and	Cisco IWAN System discloses the header comprises at least the first and second entities addresses in the packet network. For example, Cisco IWAN System discloses data traffic with IP addresses to forward the traffic flow. Cisco IWAN

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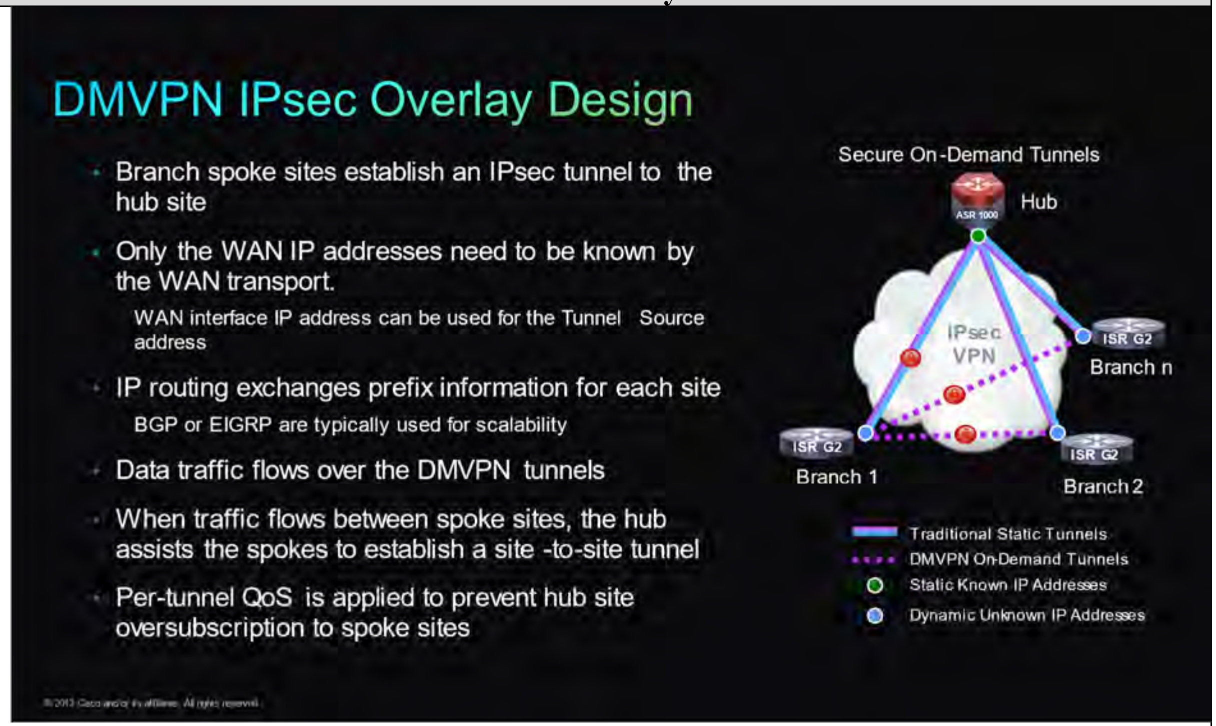

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		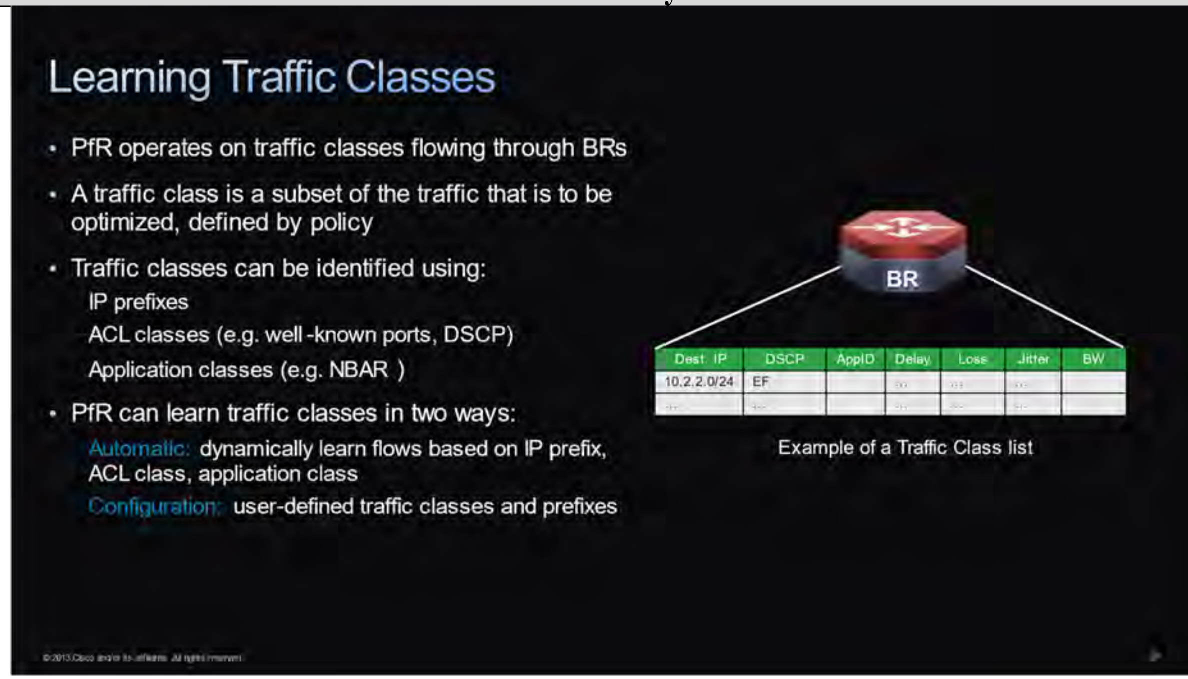
18[c]	wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses.	Cisco IWAN System discloses wherein the packet-applicable criterion is that the first entity address, the second entity address, or both match a predetermined address or addresses. For example, Cisco IWAN System discloses IP prefixes, such as IP addresses, as an identifying characteristic of traffic classes in a traffic policy. Cisco IWAN

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		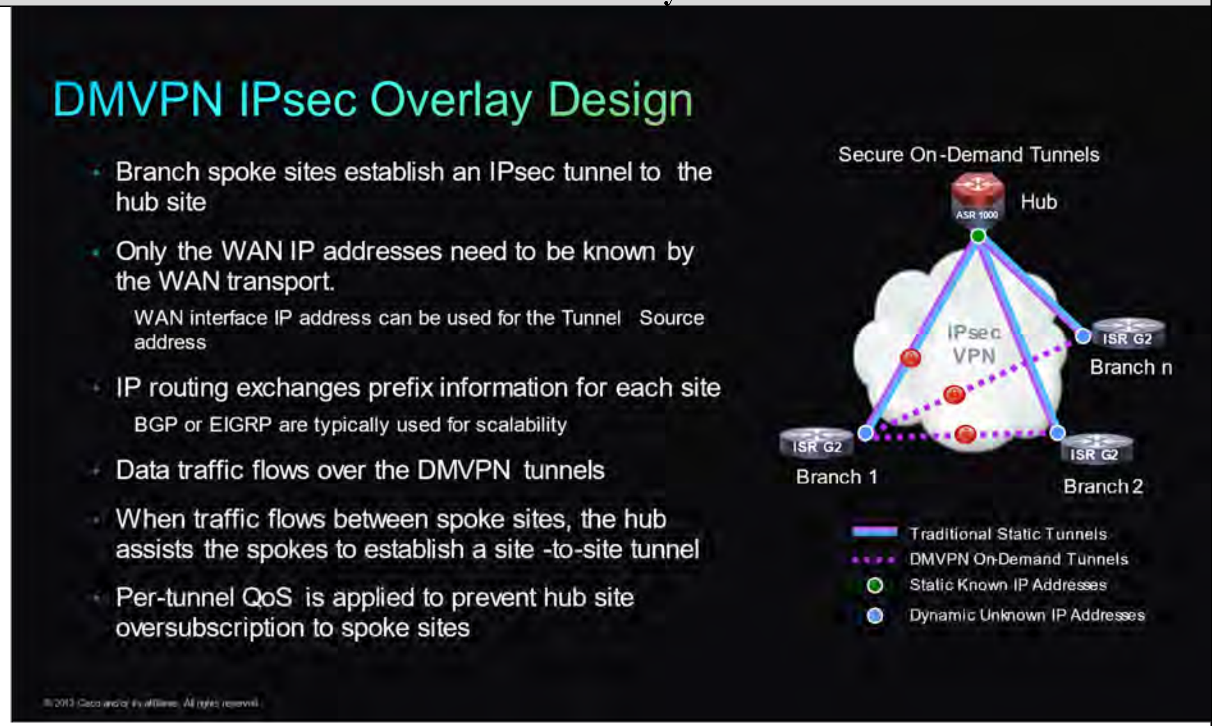 Cisco IWAN - Uncompromised Experience