said router heuristically determining whether said flow exhibits undesirable behavior by comparing at least one of said payload-content-agnostic behavioral statistics to at least one pre-determined threshold value; and

upon determination by said router that said flow exhibits undesirable behavior, enforcing, relative to at least one packet, a penalty;

wherein ~~said payload-content-agnostic behavioral statistics for said flow are calculated by~~ the preceding steps are performed on said router without requiring use of inter-router data.

42. (Currently Amended) A non-transitory computer-readable medium having computer-executable instructions for performing a method to process a single flow, the flow comprising a plurality of packets, and the method comprising:

creating a flow block as the first packet of a flow is processed by a single router;

said flow block being configured to store payload-content agnostic behavioral statistics about said flow, regardless of the presence or absence of congestion;

said router updating said flow block with the flow's behavioral statistics of each packet belonging to said flow, as each packet[[s]] belonging to said flow [[are]] is processed by said router, regardless of the presence or absence of congestion;

said router heuristically determining whether said flow is exhibiting undesirable behavior by comparing at least one of said behavioral statistics to at least one pre-determined threshold value; and

upon determination by said router that said flow is exhibiting undesirable behavior, enforcing, relative to at least one packet belonging to said flow, a penalty;

wherein ~~said behavioral statistics for said flow are calculated by~~ the preceding steps are performed on said router ~~and independent~~ without requiring use of inter-router data.

43. (Currently Amended) An article of manufacture comprising:

a non-transitory computer-readable medium having stored thereon a data structure;

a first field containing data representing a flow block;

a second field containing data representing payload-content-agnostic behavioral statistics about dropped and non-dropped packets of a flow;

a third field containing data representing pre-determined behavior threshold values;

a fourth field containing data representing the results of a heuristic determination of whether said flow exhibits undesirable behavior determined by comparing said behavioral statistics to said pre-determined threshold values;

a fifth field containing data representing at least one penalty to be enforced against at least one packet upon determination that said flow exhibits undesirable behavior.

44. (New) A machine implemented method for processing a flow, the flow comprising a series of information packets, the method comprising:

maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each information packet belonging to the flow is processed;

determining, based at least partially upon the set of behavioral statistics, whether the flow is exhibiting undesirable behavior, regardless of the presence or absence of congestion; and

in response to a determination that the flow is exhibiting undesirable behavior, enforcing a penalty on the flow.

Response to Rejections under 35 USC §101

Claims 42 and 43 were rejected for being directed to non-statutory subject matter. Claims 42 and 43 are currently amended to specify a "non-transitory computer-readable medium." Therefore, Applicant respectfully requests that these rejections be withdrawn.

Response to Rejections under 35 USC §102(e)

Independent claims 1, 5, 21, 25, 41, and 42 were rejected as being anticipated by Jacobson et al (US 2005/0226149 A1). "A claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2USPQ2d 1051, 1053 (Fed.Cir. 1987). Jacobson does not teach every element of each rejected claim.

Jacobson teaches a method:

1) that is implemented only when triggered by a certain quantity of dropped packets;
    a. Jacobson, para [0092] lines 2-3: "A flow becomes a candidate for detection when its representation in the drop record is large;"
    b. Jacobson, para [0009] lines 11-12: "A flow is only tested if it has a significant share of the recorded total drops."
    c. *See also*: Jacobson, para [0096]; claims 1, 10, 19;para [0011], lines 11-15; para [0012].
2) is based on congestion levels;
    a. Jacobson, para [0009] lines 1-4: "A network device identifies a non-adaptive flow as follows. In the presence of congestion, the network device drops packets on a random basis using a Random Early Detection (RED) algorithm;"

b. Jacobson, para [0009] lines 4-7: "The RED algorithm is used by the network device to calculate a drop interval for the arriving packet stream based on the current congestion level of the target queue."

c. Jacobson, para [0034] lines 1-4: "A Random Early Detection (RED) gateway algorithm is executed within gateway 106 for congestion avoidance in network 100. The RED gateway algorithm detects incipient congestion…"

3) whereby statistics are maintained only for packets that are dropped;

a. Jacobson, para [0009], lines 7-9: "In this invention, when a packet is dropped, one or more header fields of the packertare stored, along with a timestamp of the drop time;"

b. Jacobson, para [0082]: "Table 900 has entries for the state data for dropped packets that is retained in an exemplary embodiment of the invention…;"

c. Jacobson, para [0084] & FIG. 10: showing that statistics are maintained and analysis performed for dropped packets only;

d. Jacobson, para [0085]: explaining that the adaptiveness of a flow is based on drop intervals;

e. Jacobson, FIG. 9 entitled "State Maintained for Dropped Packets."

4) resulting in a determination of whether a flow is non-adaptive, based on drop intervals of the dropped packets.

a. Jacobson, para [0012];

b. Jacobson, FIG. 10 entitled "Flow Analysis for Dropped Packets;"

c. Jacobson, para [0084] and [0085], discussing how state information for dropped packets is used to determine drop intervals and whether a flow is non-adaptive;

d. Jacobson, para [0010] lines 4-6: "The network device then applies a statistical test to drop intervals of a plurality of flows in order to identify the non-adaptive flow."

In contrast to the Jacobson invention, Claim 1 of the present application teaches "maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each information packet belonging to the flow is processed." Thus, the flow state is maintained for all packets in a flow, regardless of the end result of their processing. *See* Natchu, para [0006] and [0029].

In other words, claim 1 is directed to a process whereby every packet in a flow is processed, accounted for, and subsequently dropped, forwarded, or otherwise treated; but, the Jacobson invention requires first dropping packets, then analyzing the dropped packets, and subsequently labeling the overall flow as adaptive or non-adaptive.

Thus, since Jacobson does not teach "maintaining a set of behavioral statistics for the flow…based on each information packet," claim 1 is not anticipated by Jacobson.

Additionally, as referenced above, Jacobson is a congestion-based mechanism. It relies on the RED algorithm to drop packets prior to identifying a non-adaptive flow, and the very fact that the RED algorithm begins to drop packets indicates that there is an onset of congestion. It is at that point only that the remaining steps of the Jacobson method can be utilized or implemented. The RED algorithm is an algorithm to detect the onset of congestion, and it reacts to the queue size by dropping packets with certain drop probability, depending on the severity of congestion as indicated by the queue size levels (Jacobson, para [0034] lines 1-8). Furthermore, the paper referenced in paragraph 0034 of Jacobson, entitled "*Random Early Detection*

Gateways for Congestion Avoidance," explicitly says "the RED gateway detects incipient congestion by computing the average queue size. The gateway could notify connections of congestion either by dropping packets arriving at the gateway or by setting a bit in packet headers" (see Abstract of the referenced paper). The very fact that Jacobson's non-adaptive flow detection mechanism relies on a RED packet drop as a trigger necessarily implies that the mechanism is valid only under congestion.

In contrast, amended claim 1 of the present application teaches: "maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each information packet belonging to the flow is processed, *regardless of the presence or absence of congestion*" (emphasis added). Jacobson does not anticipate the congestion-independent aspect of claim 1 (since, as explained above, the Jacobson mechanism is used exclusively in congestion-based situations), and therefore Applicant requests that the rejection to claim 1 be withdrawn.

Moreover, the invention in Jacobson is a nonanalogous reference to the present invention. A congestion-based, dropped packet-triggered, packet-selective, RED algorithm-based method is not a matter or invention which "logically would have commended itself to an inventor's attention in considering the invention" of a non-discriminatory, non-selective, all-packet processing mechanism for identifying and penalizing misbehaving flows, regardless of flow adaptiveness. (MPEP 2141.01(a)(I)). The matters with which the respective inventions deal are significantly different.

In light of the above discussion, Application respectfully requests that the rejections to claim 1 be withdrawn.

Claim 5 was also rejected as being anticipated by Jacobson. The elements of claim 5

parallel those of claim 1. Thus, the arguments made above with respect to claim 1 rejections also apply to the rejection of claim 5 under §102(e), and Applicant respectfully requests that the rejection to claim 5 be withdrawn.

Claim 21 was also rejected as being anticipated by Jacobson. The elements of claim 21 parallel those of claim 1. Thus, the arguments made above with respect to claim 1 rejections also apply to the rejection of claim 21 under §102(e), and Applicant respectfully requests that the rejection to claim 21 be withdrawn.

Claim 25 was also rejected as being anticipated by Jacobson. The elements of claim 25 parallel those of claim 1. Thus, the arguments made above with respect to claim 1 rejections also apply to the rejection of claim 25 under §102(e), and Applicant respectfully requests that the rejection to claim 25 be withdrawn.

Claims 41 and 42 were also rejected as being anticipated by Jacobson. The elements of claims 41 and 42 parallel those of claim 1. Thus, the arguments made above with respect to claim 1 rejections also apply to the rejections of claims 41 and 42 under §102(e) and Applicant respectfully requests that the rejections to claims 41 and 42 be withdrawn.

Claims 2, 4, 6-8, 10, 22, 24, 27-29, and 30 were also rejected as being anticipated by Jacobson. Claims 2 & 4 depend from claim 1; claims 6-8 and 10 depend from claim 5; claims 22 & 24 depend from claim 21; and claims 27-29 and 30 depend from claim 25. Claims in dependent form shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim. 37 CFR 1.75. As shown above, claims 1, 5, 21, and 25 are not anticipated by Jacobson. Therefore, Applicant respectfully requests that the rejections to claims 2, 4, 6-8, 10, 22, 24, 27-29, and 30 be withdrawn as well.

Response to Rejections under 35 USC §103(a)

Claims 3, 12-14, 18, 23, 32-34, and 38 were rejected as being unpatentable over Jacobson in view of Skirmont (US 6,252,848 B1). Claims 9 and 29 were rejected as being unpatentable over Jacobson in view of Zikan (US 6,310,881 B1). Claims 11 and 31 were rejected as being unpatentable over Jacobson in view of Afanador (US 6,167,041). Claims 15-17, 35-37 were rejected as being unpatentable over Jacobson in view of Scifres (US 7,113,990 B2). Claims 19, 20, 39, and 40 were rejected as being unpatentable over Jacobson in view of Kejriwal (US 6,934,250 B1).

The prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP §2143.

Claims in dependent form shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim. 37 CFR 1.75. Claim 3 is dependent on independent claim1 and therefore includes all the limitations of claim 1. Claims 9, 11-17, 18-20 are dependent on independent claim 5 and therefore include all the limitations of claim 5. Claim 23 is dependent on independent claim 21 and therefore includes all the limitations of claim 21. Claims 29, 31-40 are dependent on independent claim 25 and therefore include all the limitations of claim 25. As explained above with respect to the §102 rejections, independent claims 1, 5, 21, and 25 are not anticipated by Jacobson. It follows that Jacobson, in view of any combination of cited references, does not teach or suggest all the claim limitations of claims 3, 9, 11-17, 18-20, 23, 29, 31-40. Therefore, Applicant respectfully requests that the rejections to these claims be withdrawn.

Moreover, with respect to claims 12 and 32, the Skirmont reference cannot be used to modify Jacobson to apply to non-congestion conditions. Column 5, lines 21-24 were pointed out

in the Office Action. However, this specific reference simply states the fact that the RED algorithm may drop packets without regard to whether they were the packets causing congestion in the first place. But, the fact that packets were dropped due to the RED algorithm indicating the onset of congestion cannot be ignored. "The dropping of packets effectively signals congestion in a data network" (Skirmont, col. 1, lines 52-53 and col. 5, lines 17-18).

Skirmont's invention may teach a method for identifying *which* packets to drop in a congestion situation, but in the end it is still an invention to be utilized in congestion conditions, with dropped packets (and, as explained above, dropped packets happen at the onset of congestion). In contrast, claims 12 and 32 teach a mechanism that can operate on every packet, in the absence of congestion. Since a mechanism that stores behavioral statistics about *each* packet, and which operates regardless of whether any congestion is encountered, is not taught or suggested by Jacobson and/or Skirmont, Applicant requests that these rejections be withdrawn. Likewise, Skirmont cannot be used in combination with Jacobson as a basis for rejecting any other claim, since independent claims 1, 5, 21, 25, 41, and 42 are all "regardless of the presence or absence of congestion."

Claim 43 was rejected as being unpatentable over Jacobson in view of Yazaki (US 2010/0110889 A1). Claim 43 is currently amended to specify "a second field containing data representing payload-content-agnostic behavioral statistics about dropped and non-dropped packets of a flow." Jacobson does not teach or suggest gathering statistics pertaining to non-dropped packets of a flow. Moreover, Jacobson cannot be modified in any reasonable manner to include statistic or statistical analysis pertaining to any type of packets other than dropped packets. Thus, Jacobson, in view of Yazaki, does not teach or suggest all the claim limitations of claim 43 and Applicant respectfully requests that the rejections to this claim be withdrawn.

Conclusion

Applicant respectfully asserts that the cited references do not render the claims unpatentable, either singularly or in combination. In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application should be allowed and a Notice of Allowance is earnestly solicited. The Examiner is respectfully requested to telephone the undersigned if she can assist in any way in expediting the issuance of a patent.

Respectfully submitted,

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Appendix A: Clean Copy of Amended Claims

What is claimed is:

1. (Currently Amended) A machine implemented method for processing a flow, the flow comprising a series of information packets, the method comprising:

maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each information packet belonging to the flow is processed, regardless of the presence or absence of congestion;

determining, based at least partially upon the set of behavioral statistics, whether the flow is exhibiting undesirable behavior; and

in response to a determination that the flow is exhibiting undesirable behavior, enforcing a penalty on the flow.

2. (Original) The method of claim 1, wherein enforcing the penalty has an effect of correcting the flow's behavior such that the flow exhibits less undesirable behavior.

3. (Original) The method of claim 1, wherein enforcing the penalty comprises:

imposing an increased drop rate on the flow such that the information packets belonging to the flow have a higher probability of being dropped than information packets belonging to other flows that do not exhibit undesirable behavior.

4. (Original) The method of claim 1, wherein the penalty is enforced when a congestion condition is encountered.

5. (Currently Amended) A machine implemented method for processing a flow, the flow comprising a series of information packets, the method comprising:

maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each

information packet belonging to the flow is processed, regardless of the presence or absence of congestion; and

computing, based at least partially upon the set of behavioral statistics, a badness factor for the flow, wherein the badness factor provides an indication of whether the flow is exhibiting undesirable behavior.

6. (Original) The method of claim 5, wherein the badness factor also provides an indication of a degree to which the flow is behaving undesirably.

7. (Original) The method of claim 6, further comprising:

determining, based at least partially upon the badness factor, a penalty to impose on the flow.

8. (Original) The method of claim 7, further comprising: enforcing the penalty on the flow.

9. (Original) The method of claim 8, wherein enforcing the penalty on the flow causes the flow to exhibit less undesirable behavior, thereby, causing the badness factor of the flow to improve.

10. (Original) The method of claim 8, wherein the penalty is enforced on the flow when a congestion condition is encountered.

11. (Original) The method of claim 8, wherein no penalty is enforced on the flow unless a congestion condition is encountered, regardless of how undesirably the flow is behaving.

12. (Original) The method of claim 8, wherein the penalty is determined and enforced on the flow even when no congestion condition is encountered.

13. (Original) The method of claim 8, wherein determining the penalty comprises:

determining an increased drop rate to impose on one or more information packets belonging to the flow.

14. (Original) The method of claim 13, wherein enforcing the penalty comprises:

imposing the increased drop rate on the flow such that the information packets belonging to the flow have a higher probability of being dropped than information packets belonging to other flows that do not exhibit undesirable behavior.

15. (Original) The method of claim 5, wherein the set of behavioral statistics comprises a measure T of how much total information has been contained in all of the information packets belonging to the flow that have been forwarded up to a current point in time.

16. (Original) The method of claim 5, wherein the set of behavioral statistics comprises a measure L of how long the flow has been in existence up to a current point in time.

17. (Original) The method of claim 16, wherein the set of behavioral statistics comprises a rate R of information transfer for the flow, wherein R is derived by dividing T by L.

18. (Original) The method of claim 5, wherein the set of behavioral statistics comprises an average size for the information packets belonging to the flow.

19. (Original) The method of claim 5, wherein maintaining the set of behavioral statistics comprises:

receiving a particular information packet belonging to the flow;

determining whether to forward the particular information packet to a destination; and

in response to a determination to forward the particular information packet to the destination, updating the set of behavioral statistics to reflect processing of the particular information packet.

20. (Original) The method of claim 5, wherein maintaining the set of behavioral statistics comprises:

receiving a particular information packet belonging to the flow; and

updating the set of behavioral statistics to reflect processing of the particular information packet, regardless of whether the particular information packet is discarded or forwarded to a destination.

21. (Currently Amended) A misbehaving flow manager (MFM) for processing a flow, the flow comprising a series of information packets, the MFM comprising:

means for maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each information packet belonging to the flow is processed, regardless of the presence or absence of congestion;

means for determining, based at least partially upon the set of behavioral statistics, whether the flow is exhibiting undesirable behavior; and

means for enforcing, in response to a determination that the flow is exhibiting undesirable behavior, a penalty on the flow.

22. (Original) The MFM of claim 21, wherein enforcing the penalty has an effect of correcting the flow's behavior such that the flow exhibits less undesirable behavior.

23. (Original) The MFM of claim 21, wherein the means for enforcing the penalty comprises:

means for imposing an increased drop rate on the flow such that the information packets belonging to the flow have a higher probability of being dropped than information packets belonging to other flows that do not exhibit undesirable behavior.

24. (Original) The MFM of claim 21, wherein the penalty is enforced when a congestion condition is encountered.

25. (Currently Amended) A misbehaving flow manager (MFM) for processing a flow, the flow comprising a series of information packets, the MFM comprising:

means for maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each information packet belonging to the flow is processed, regardless of the presence or absence of congestion; and

means for computing, based at least partially upon the set of behavioral statistics, a badness factor for the flow, wherein the badness factor provides an indication of whether the flow is exhibiting undesirable behavior.

26. (Original) The MFM of claim 25, wherein the badness factor also provides an indication of a degree to which the flow is behaving undesirably.

27. (Original) The MFM of claim 26, further comprising:

means for determining, based at least partially upon the badness factor, a penalty to impose on the flow.

28. (Original) The MFM of claim 27, further comprising: means for enforcing the penalty on the flow.

29. (Original) The MFM of claim 28, wherein enforcing the penalty on the flow causes the flow to exhibit less undesirable behavior, thereby, causing the badness factor of the flow to improve.

30. (Original) The MFM of claim 28, wherein the penalty is enforced on the flow when a congestion condition is encountered.

31. (Original) The MFM of claim 28, wherein no penalty is enforced on the flow unless a congestion condition is encountered, regardless of how undesirably the flow is behaving.

32. (Original) The MFM of claim 28, wherein the penalty is determined and enforced on the flow even when no congestion condition is encountered.

33. (Original) The MFM of claim 28, wherein the means for determining the penalty comprises:

means for determining an increased drop rate to impose on one or more information packets belonging to the flow.

34. (Original) The MFM of claim 33, wherein the means for enforcing the penalty comprises:

means for imposing the increased drop rate on the flow such that the information packets belonging to the flow have a higher probability of being dropped than information packets belonging to other flows that do not exhibit undesirable behavior.

35. (Original) The MFM of claim 25, wherein the set of behavioral statistics comprises a measure T of how much total information has been contained in all of the information packets belonging to the flow that have been forwarded up to a current point in time.

36. (Original) The MFM of claim 25, wherein the set of behavioral statistics comprises a measure L of how long the flow has been in existence up to a current point in time.

37. (Original) The MFM of claim 36, wherein the set of behavioral statistics comprises a rate R of information transfer for the flow, wherein R is derived by dividing T by L.

38. (Original) The MFM of claim 25, wherein the set of behavioral statistics comprises an average size for the information packets belonging to the flow.

39. (Original) The MFM of claim 25, wherein the means for maintaining the set of behavioral statistics comprises:

means for receiving a particular information packet belonging to the flow;

means for determining whether to forward the particular information packet to a destination; and

means for updating, in response to a determination to forward the particular information packet to the destination, the set of behavioral statistics to reflect processing of the particular information packet.

40. (Original) The MFM of claim 25, wherein the means for maintaining the set of behavioral statistics comprises:

means for receiving a particular information packet belonging to the flow; and

means for updating the set of behavioral statistics to reflect processing of the particular information packet, regardless of whether the particular information packet is discarded or forwarded to a destination.

41. (Currently Amended) A machine-implemented method for processing a single flow, the flow comprising a plurality of packets, and the method comprising:

creating a flow block as the first packet of a flow is processed by a single router;

said flow block being configured to store payload-content-agnostic behavioral statistics pertaining to said flow, regardless of the presence or absence of congestion;

said router updating said flow block with the payload-content-agnostic behavioral statistics of each packet belonging to said flow, as each packet belonging to said flow is processed by said router, regardless of the presence or absence of congestion;

said router heuristically determining whether said flow exhibits undesirable behavior by comparing at least one of said payload-content-agnostic behavioral statistics to at least one pre-determined threshold value; and

upon determination by said router that said flow exhibits undesirable behavior, enforcing, relative to at least one packet, a penalty;

wherein the preceding steps are performed on said router without requiring use of inter-router data.

42. (Currently Amended) A non-transitory computer-readable medium having computer-executable instructions for performing a method to process a single flow, the flow comprising a plurality of packets, and the method comprising:

creating a flow block as the first packet of a flow is processed by a single router;

said flow block being configured to store payload-content agnostic behavioral statistics about said flow, regardless of the presence or absence of congestion;

said router updating said flow block with the flow's behavioral statistics of each packet belonging to said flow, as each packet belonging to said flow is processed by said router, regardless of the presence or absence of congestion;

said router heuristically determining whether said flow is exhibiting undesirable behavior by comparing at least one of said behavioral statistics to at least one pre-determined threshold value; and

upon determination by said router that said flow is exhibiting undesirable behavior, enforcing, relative to at least one packet belonging to said flow, a penalty;

wherein the preceding steps are performed on said router without requiring use of inter-router data.

43. (Currently Amended) An article of manufacture comprising:

a non-transitory computer-readable medium having stored thereon a data structure;

a first field containing data representing a flow block;

a second field containing data representing payload-content-agnostic behavioral statistics about dropped and non-dropped packets of a flow;

a third field containing data representing pre-determined behavior threshold values;

a fourth field containing data representing the results of a heuristic determination of whether said flow exhibits undesirable behavior determined by comparing said behavioral statistics to said pre-determined threshold values;

a fifth field containing data representing at least one penalty to be enforced against at least one packet upon determination that said flow exhibits undesirable behavior.

44. (New) A machine implemented method for processing a flow, the flow comprising a series of information packets, the method comprising:

maintaining a set of behavioral statistics for the flow, wherein the set of behavioral statistics is updated based on each information packet belonging to the flow, as each information packet belonging to the flow is processed;

determining, based at least partially upon the set of behavioral statistics, whether the flow is exhibiting undesirable behavior, regardless of the presence or absence of congestion; and

in response to a determination that the flow is exhibiting undesirable behavior, enforcing a penalty on the flow.

Electronic Patent Application Fee Transmittal

Application Number:	11022599
Filing Date:	22-Dec-2004
Title of Invention:	Mechanism for identifying and penalizing misbehaving flows in a network
First Named Inventor/Applicant Name:	Vishnu Natchu
Filer:	Sara Elizabeth Dirvianskis
Attorney Docket Number:	SABLE-01008

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Claims in excess of 20	2202	1	26	26
Independent claims in excess of 3	2201	1	110	110
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Extension - 3 months with $0 paid	2253	1	555	555
Miscellaneous:				
		Total in USD ($)		**691**

Electronic Acknowledgement Receipt

EFS ID:	9498124
Application Number:	11022599
International Application Number:	
Confirmation Number:	8956
Title of Invention:	Mechanism for identifying and penalizing misbehaving flows in a network
First Named Inventor/Applicant Name:	Vishnu Natchu
Customer Number:	43490
Filer:	Sara Elizabeth Dirvianskis
Filer Authorized By:	
Attorney Docket Number:	SABLE-01008
Receipt Date:	22-FEB-2011
Filing Date:	22-DEC-2004
Time Stamp:	20:33:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$691
RAM confirmation Number	11828
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Amendment/Req. Reconsideration-After Non-Final Reject	20110222-SABLE-01008_ROA_FinalSDP.pdf	195074 5bcbe759ac889d2f9de4eaa404af16601aa670ef	no	29
Warnings:					
Information:					
2	Fee Worksheet (PTO-875)	fee-info.pdf	33530 5b1312484b72f34d6e1a0876cbfa518b217b8b81	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	228604		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/022,599	12/22/2004	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 02/22/2011	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 44	Minus	** 43	= 1	X $ =		OR	X $52=	52
Independent (37 CFR 1.16(h))	* 8	Minus	***7	= 1	X $ =		OR	X $220=	220
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	272

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/TAMARA DARKO/

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/022,599	12/22/2004	Vishnu Natchu	SABLE-01008	8956

43490 7590 05/16/2011

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EXAMINER	
WONG, XAVIER S	

ART UNIT	PAPER NUMBER
2462	

NOTIFICATION DATE	DELIVERY MODE
05/16/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATENT@WESTPATENTLAW.COM
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STUARTJAMESWEST@COMCAST.NET

Office Action Summary	Application No.	Applicant(s)	
	11/022,599	NATCHU, VISHNU	
	Examiner	Art Unit	
	Xavier Szewai Wong	2462	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22nd February 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **1**, **2**, **4 – 8**, **10**, **21**, **22**, **24**, **25**, **27 – 30**, **41**, **42** and **44** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jacobson** et al (**US 2005/0226149 A1**) in view of **Malan** et al (**US 2002/0032717 A1**).

Consider claims **1**, **21** and **44**, **Jacobson** et al teach a dynamic load balancer (e.g. MFM) and machine-implemented method for processing a flow which comprises of a series of information packets (fig. 1: gateway 106; *abstract*: to identify a non-adaptive flow; [0009] lines 13-15: per-flow basis), the balancer comprising means for: maintaining a set of behavioral statistics, which are updated as information packets belong to the flow are processed, for the flow ([0098]: changing parameters… statistical method for a flow); determining, based upon the behavioral statistics, whether the flow is exhibiting undesirable behavior ([0086]: detect non-adaptive flow); enforcing, in response to the determination of undesirable behavior, a penalty on the flow ([0101-0102]: penalty for a flow). **Jacobsen** et al do not very explicitly mention the set of behavioral statistics is updated based on *each* information packet belonging to the flow, as *each* information packet belonging to the flow is processed, *regardless of the presence or absence of congestion*. **Malan** et al teaches concept function of set of behavioral statistics is updated based on *each* information packet belonging to the flow, as *each* information packet belonging to the flow is processed, *regardless of the presence or absence of*

congestion ([0119]: Flow statistics aggregate a flow's individual packet statistics into a single statistic – when individual packet statistics are aggregated (e.g. accumulated), the single statistic varies accordingly as individual packet statistics get accumulated; there is no congestion condition requirement in **Malan**). It would have been obvious to one of ordinary skill in the art when the invention was made to modify the behavioral statistic update method of Jacobsen et al to that of Malan et al for more effective profiling of network flows.

Consider claims **5** and **25**, **Jacobson** et al disclose a dynamic load balancer (e.g. MFM) for processing a flow which comprises of a series of information packets (fig. 1: gateway 106; *abstract*: to identify a non-adaptive flow; [0009] lines 13-15: per-flow basis; [0056]: a series of packets), the balancer comprising means for: maintaining a set of behavioral statistics, which are updated as information packets belong to the flow are processed, for the flow ([0098]: changing parameters… statistical method for a flow); computing, based at least partially upon the set of behavioral statistics, a badness factor for the flow ([0097]: DEM for a flow), to provide indication of whether the flow is exhibiting undesirable behavior ([0101-0103]: penalty for a flow). **Jacobsen** et al do not very explicitly mention the set of behavioral statistics is updated based on *each* information packet belonging to the flow, as *each* information packet belonging to the flow is processed, *regardless of the presence or absence of congestion*. **Malan** et al teaches concept function of set of behavioral statistics is updated based on *each* information packet belonging to the flow, as *each* information packet belonging to the flow is processed, *regardless of the presence or absence of congestion* ([0119]: Flow

statistics aggregate a flow's individual packet statistics into a single statistic – when individual packet statistics are aggregated (e.g. accumulated), the single statistic varies accordingly as individual packet statistics get accumulated; there is no congestion condition requirement in **Malan**). It would have been obvious to one of ordinary skill in the art when the invention was made to modify the behavioral statistic update method of Jacobsen et al to that of Malan et al for more effective profiling of network flows.

Consider claims **2** and **22**, as applied to claims **1** and **21**, **Jacobson** et al teach means for the penalty has an effect of correcting the flow's behavior such that the flow exhibits less undesirable behavior ([0101]: reduce sending rate for non-adaptive flow).

Consider claims **4**, **10**, **24** and **30**, as applied to claims **1**, **8**, **21** and **28**, **Jacobson** et al teach that the invention is to solve, among other misbehaviors/faults, congestion in a network ([0098]: congestion); the penalty function is enforced when a misbehavior/fault, such as a congestion, is encountered ([0100-0103]: penalty).

Consider claims **6** and **26**, as applied to claims **5** and **25**, **Jacobson** et al teach the badness factor providing an indication of a degree to which the flow is behaving undesirably ([0097]: DEM for a flow).

Consider claims **7**, **8**, **27** and **28** as applied to claims **6**, **7**, **26** and **27**, **Jacobson** et al teach means for determining, based on the badness factor, a penalty to impose and enforce on the flow ([0098] lines 15-24).

Consider claims **41** and **42**, **Jacobson** et al teach a machine-implemented method for processing a single flow by a computer readable medium having computer-executable instructions (fig. 1: gateway 106; *abstract*: to identify a non-adaptive flow; [0009] lines 13-15: per-flow basis), the flow comprising a plurality of packets ([0056]: a series of packets) and the method comprising:

creating a flow block as the first packet of a flow is processed by a single router (fig. 9: flow block 904 in gateway 106);

said flow block being configured to store payload-content-agnostic behavioral statistics pertaining to said flow ([0095-0097]);

said router updating said flow block with the payload-content-agnostic behavioral statistics as packets belonging to said flow are processed by the router ([0098]: changing parameters… statistical method for a flow);

said router heuristically determining whether said flow exhibits undesirable behavior by comparing at least one of said payload-content-agnostic behavioral statistics to at least one pre-determined threshold value (fig. 2: lower and upper thresholds; [0098] + claims 4 and 5: comparing DEM of a flow to a range); and

upon determination by said router that said flow exhibits undesirable behavior, enforcing, relative to at least one packet, a penalty ([0101-0103]: penalty);

wherein said payload-content-agnostic behavioral statistics for said flow are calculated by said router without (independent of) use of inter-router data (fig. 1: only gateway 106 is used, so there is not other “inter-router” data for gateway 106 to depend on).

Jacobsen et al do not very explicitly mention the set of behavioral statistics is updated based on *each* information packet belonging to the flow, as *each* information packet belonging to the flow is processed, *regardless of the presence or absence of congestion*. **Malan** et al teaches concept function of set of behavioral statistics is updated based on *each* information packet belonging to the flow, as *each* information packet belonging to the flow is processed, *regardless of the presence or absence of congestion* ([0119]: Flow statistics aggregate a flow's individual packet statistics into a single statistic – when individual packet statistics are aggregated (e.g. accumulated), the single statistic varies accordingly as individual packet statistics get accumulated; there is no congestion condition requirement in **Malan**). It would have been obvious to one of ordinary skill in the art when the invention was made to modify the behavioral statistic update method of Jacobsen et al to that of Malan et al for more effective profiling of network flows.

Claims **3**, **12**, **13**, **14**, **18**, **23**, **32**, **33**, **34** and **38** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jacobson** et al (**US 2005/0226149 A1**) in view of **Malan** et al (**US 2002/0032717 A1**) and in further view of **Skirmont** (**US 6,252,848 B1**).

Consider claims **3**, **13**, **14**, **23**, **33** and **34**, as applied to claims **1**, **8**, **13**, **21**, **28** and **33**, **Jacobson** et al teach the penalty imposed involve lost packets (Jacobsen, [0103]: dropped packet record … penalty box). However, **Jacobson** et al may not have *explicitly* mentioned an increased drop rate such that a misbehaving flow has a higher probability of being dropped than flows that do not exhibit undesirable misbehavior.