



08/595323

CERTIFICATE OF MAILING BY "EXPRESS MAIL"
"Express Mail" Mailing Label No. TB812048578US
Date of Deposit February 1, 1996. I hereby certify that
this paper or fee is being deposited with sufficient postage with the
United States Postal Services "Express Mail Post Office to Addressee" service under
37 CFR 1.10 on the date indicated above and is addressed to Box Patent
Application, Assistant Commissioner for Patents, Washington, D.C. 20231

Donna L. Hengst
Donna L. Hengst
(Signature of Person Mailing Paper or Fee)

PATENT
Attorney Docket No. 16326.701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UTILITY PATENT
APPLICATION TRANSMITTAL LETTER

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Enclosed for filing is an original patent application or, a continuation-in-part patent application, by Daniel Joseph Samuel, Marc Peter Kwiatkowski and Jeffrey Jackiel Rothschild for

SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS.

Also enclosed are:

- 11 sheet(s) of formal informal drawing(s);
- a claim for foreign priority under 35 U.S.C. §§ 119 and/or 365 in
- a separate document the declaration;
- a certified copy of the priority document;
- an Associate Power of Attorney;
- 1 verified statement claiming small entity status; and
- an Assignment document and form PTO-1595.

The declaration of the inventor(s) also is enclosed will follow.

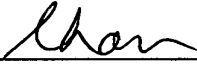
The fee has been calculated as follows:

CLAIMS					
	NO. OF CLAIMS		EXTRA CLAIMS	RATE	FEE
Basic Application Fee					\$750.00
Total Claims	16	MINUS 20 =	-0-	\$22.00=	-0-
Independent Claims	3	MINUS 3 =	-0-	\$78.00=	-0-
If multiple dependent claims are presented, add \$250.00					-0-
Total Application Fee					\$750.00
If verified statement claiming small entity status is enclosed, subtract 50% of Total Application Fee					\$375.00
Add Recording Fee of \$40.00 if Assignment document is enclosed					\$40.00
TOTAL APPLICATION FEE DUE					\$415.00

- A check in the amount of \$___ is enclosed.
 Charge \$415.00 to Deposit Account No. 23-2415.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 23-2415 (Our Docket No. 16326-701). A duplicate of this paper is enclosed.

Respectfully submitted,
WILSON, SONSINI, GOODRICH & ROSATI

By 
H.C. Chan
Registration No. 35,477

650 Page Mill Road
Palo Alto, CA 94304-1050
(415) 493-9300
Date: February 1, 1996

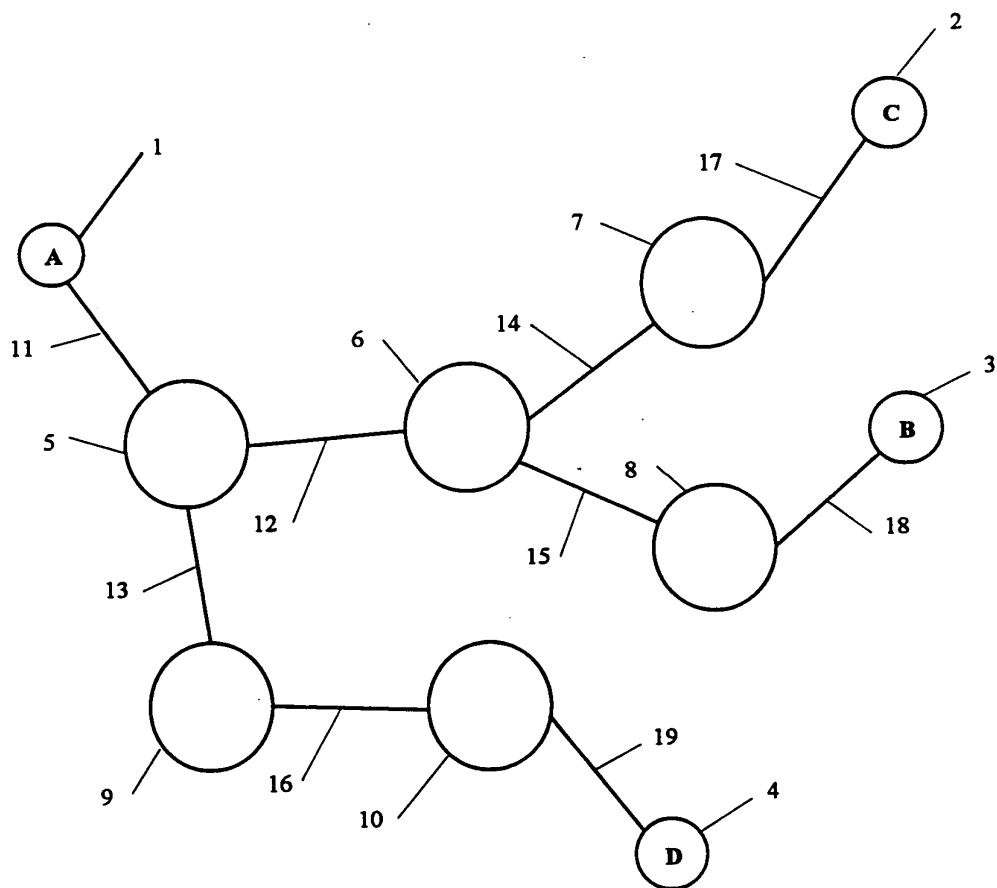


Figure 1



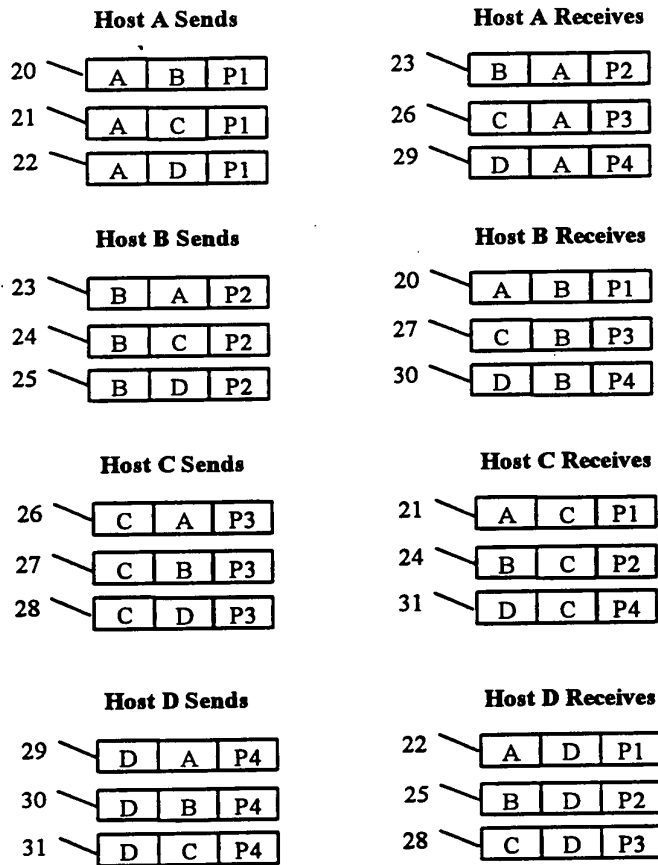


Figure 2

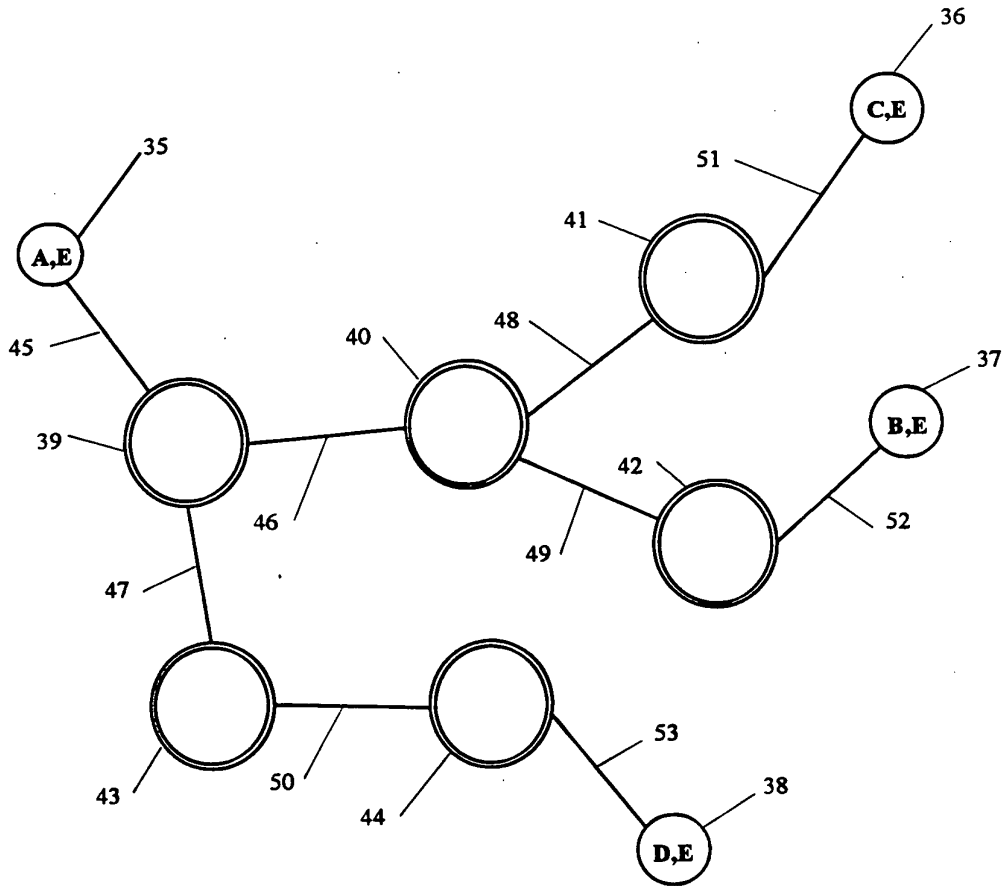


Figure 3

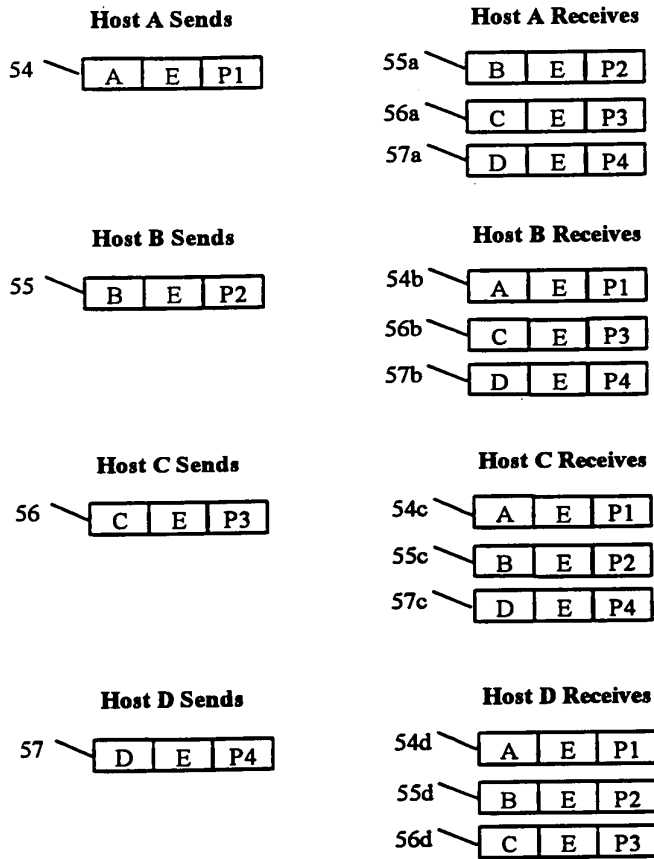


Figure 4

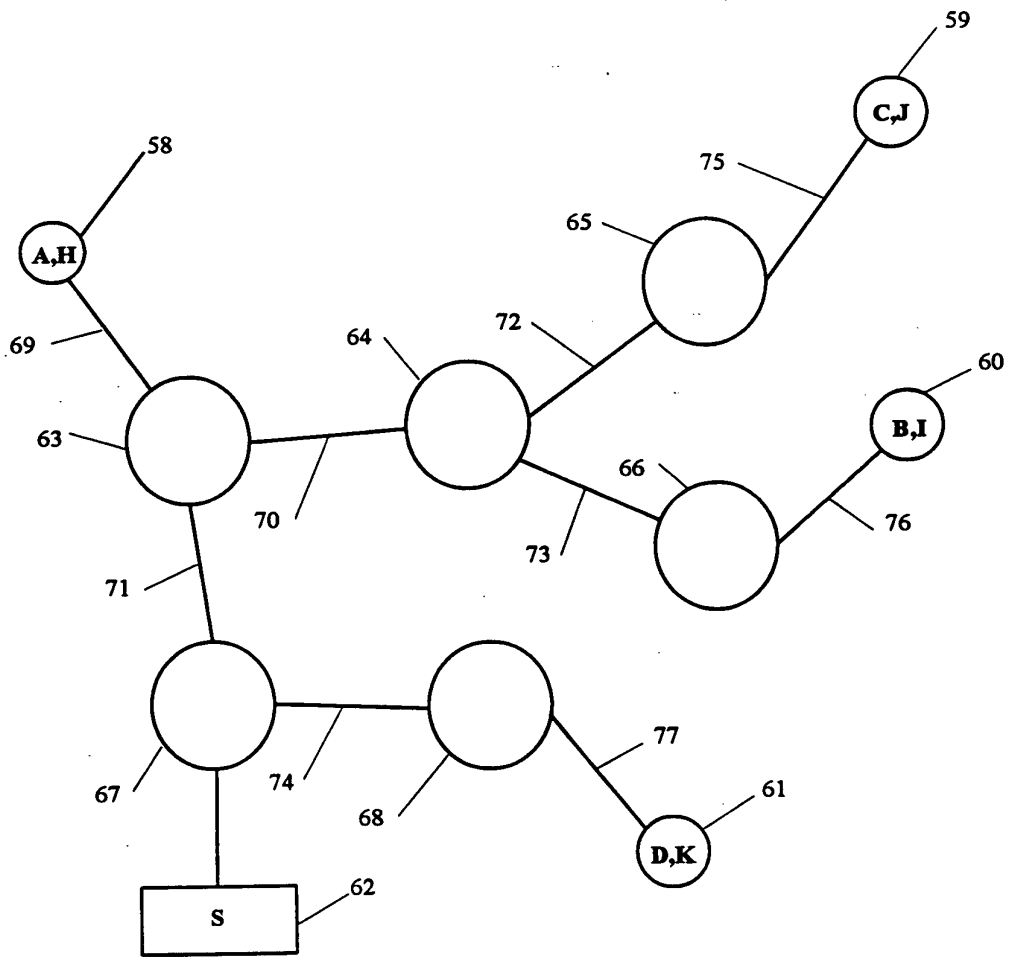


Figure 5

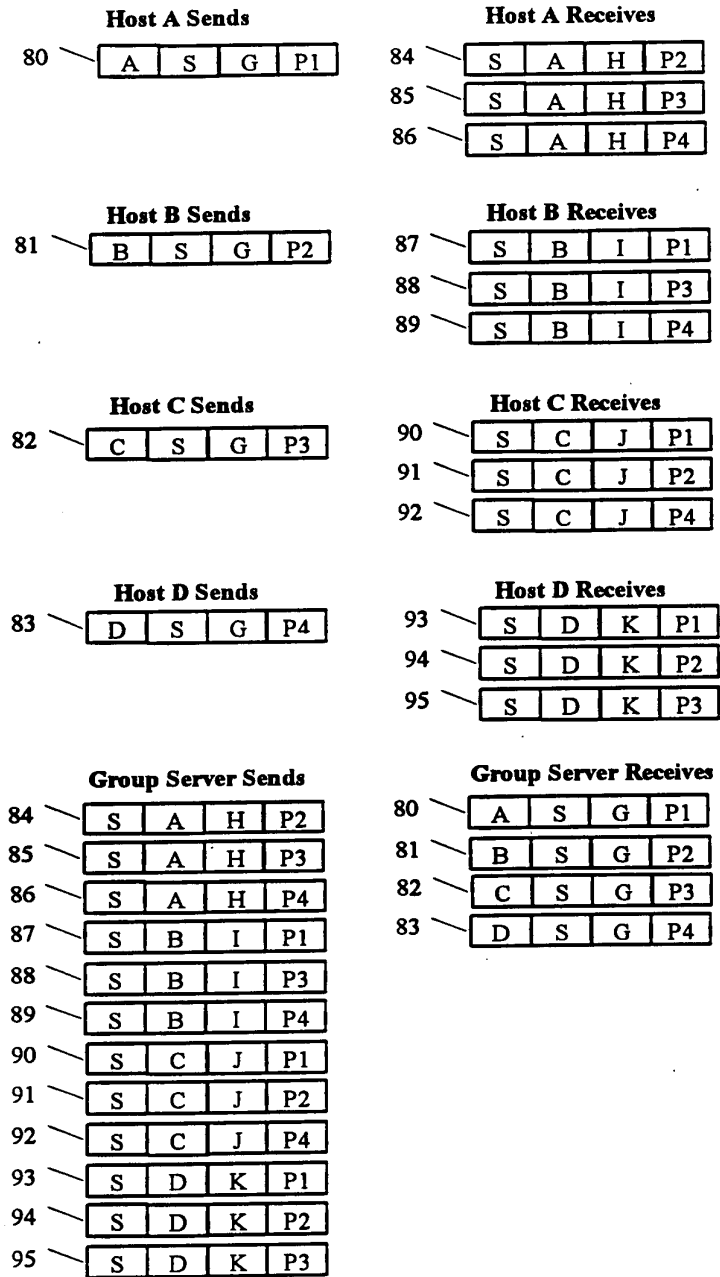


Figure 6

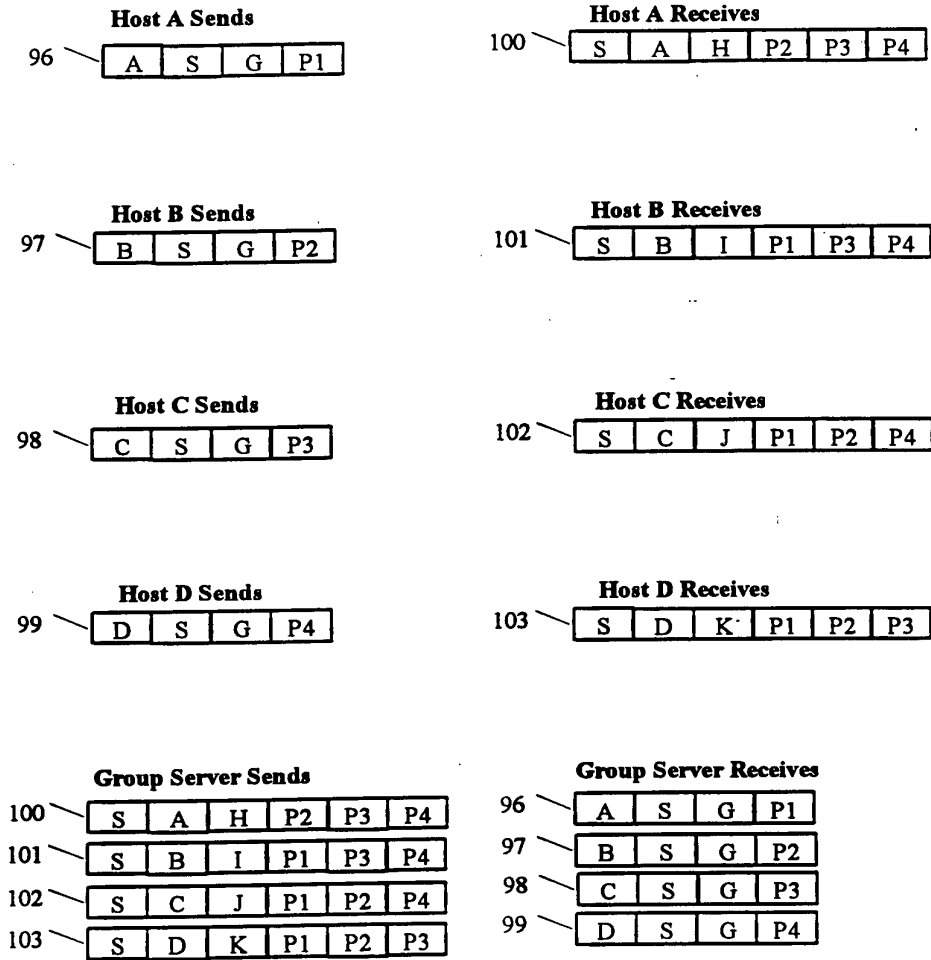


Figure 7

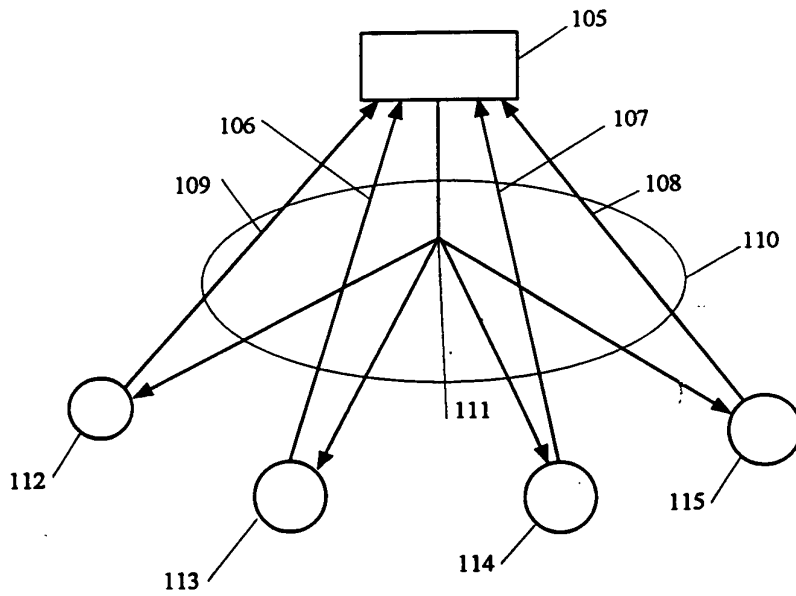


Figure 8

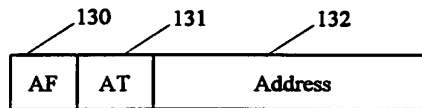
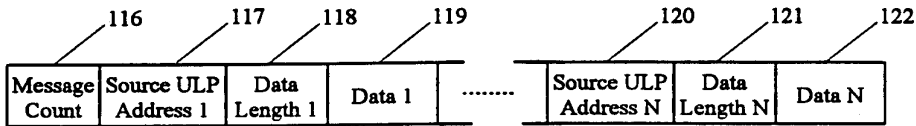
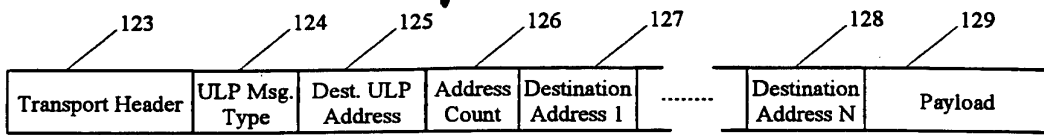


Figure 9

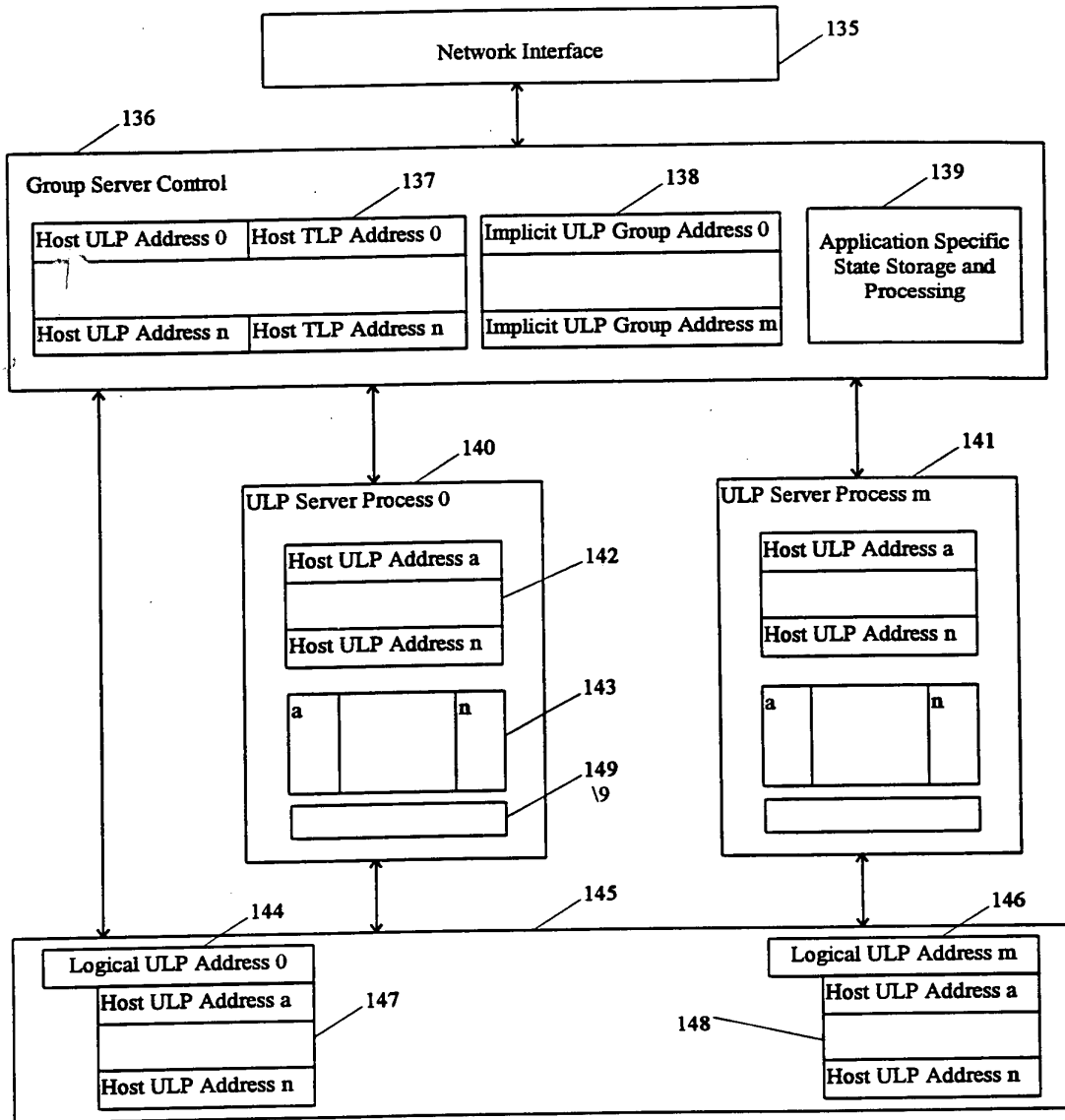


Figure 10

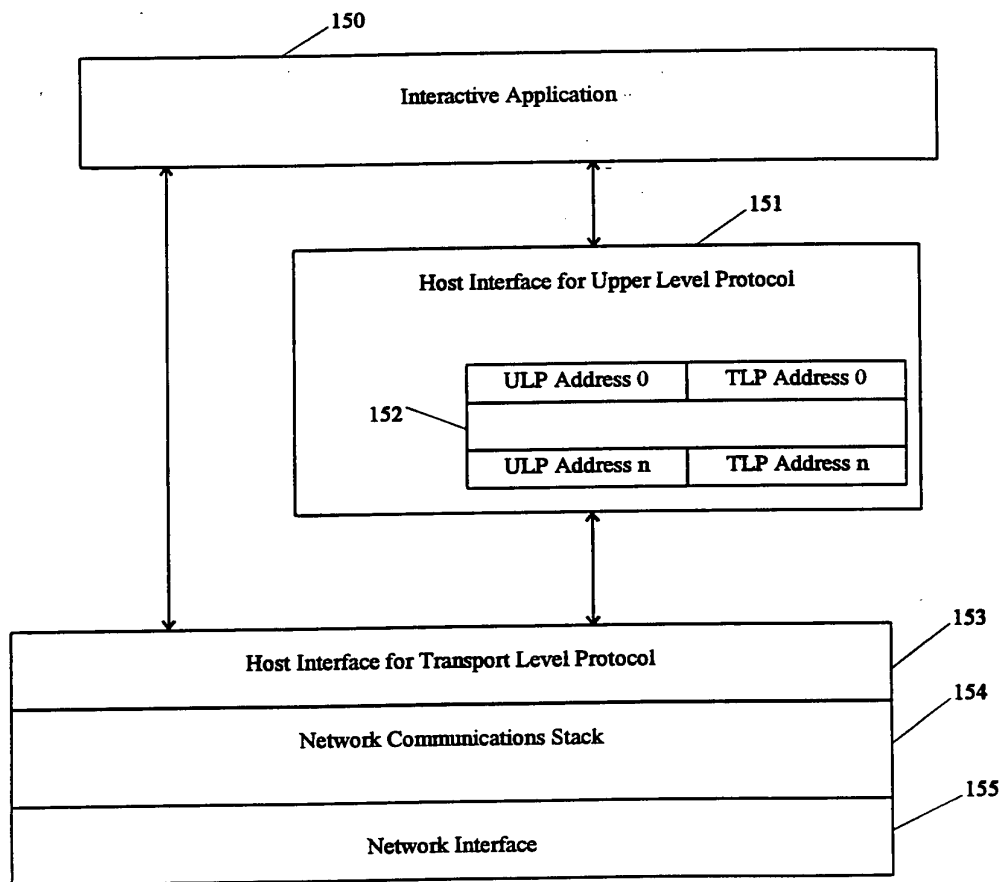


Figure 11



08/595323

CERTIFICATE OF MAILING BY "EXPRESS MAIL"
"Express Mail" Mailing Label No. TB812048578US
Date of Deposit February 1, 1996. I hereby certify that
this paper or fee is being deposited with the United States Postal
Services "Express Mail Post Office to Addressee" service under
37 CFR 1.10 on the date indicated above and is addressed to:
Assistant Commissioner for Patents, Washington, D.C. 20231

Donna L. Hengst
Donna L. Hengst

PATENT
Attorney Docket No. 16326-701

SERVER-GROUP MESSAGING SYSTEM
FOR INTERACTIVE APPLICATIONS

Inventors: Daniel Joseph Samuel
Marc Peter Kwiatkowski
Jeffrey Jackiel Rothschild

FIELD OF THE INVENTION

The present invention relates to computer network systems, and particularly to server group messaging systems and methods for reducing message rate and latency.

5

Background of the Invention

There are a wide range of interactive applications implemented on computer systems today. All are characterized by dynamic response to the user. The user provides input to the computer and the application responds quickly. One popular example of interactive applications on personal computers (PCs) are games. In this case, rapid response to the user may mean redrawing the screen with a new picture in between 30ms and 100ms. Interactive applications such as games control the speed of their interaction with the user through an internal time base. The application uses this time base to derive rates at which the user input is sampled, the screen is redrawn and sound is played.

15

2

As computers have become more powerful and common, it has become important to connect them together in networks. A network is comprised of nodes and links. The nodes are connected in such a way that there exists a path from each node over the links and through the other nodes to each of the other nodes in the network. Each node may be connected to the network with one or more links. Nodes are further categorized into hosts, gateways and routers. Hosts are computer systems that are connected to the network by one link. They communicate with the other nodes on the network by sending messages and receiving messages. Gateways are computer systems connected to the network by more than one link. They not only communicate with the other nodes as do hosts, but they also forward messages on one of their network links to other nodes on their other network links. This processing of forwarding messages is called routing. In addition to sending and receiving messages and their routing functions, gateways may perform other functions in a network. Routers are nodes that are connected to the network by more than one link and whose sole function is the forwarding of messages on one network link to the other network links to which it is connected. A network consisting of many network links can be thought of as a network of sub-networks with gateways and/or routers connecting the sub-networks together into what is called an internet. Today the widely known example of a world wide internet is the so called "Internet" which in 1995 has over 10 million computers connected full time world-wide.

With so many computers on a single world-wide network, it is desirable to create interactive networked applications that bring together many people in a shared, networked, interactive application. Unfortunately, creating such

3

shared, networked, interactive applications runs into the limitations of the existing network technology.

As an example, consider a game designed to be deployed over a network which is to be played by multiple players simultaneously. The game could be implemented in software on a PC connected to a network. A rate set by its internal time base, it would sample the inputs of the local user, receive messages from the network from the PCs of the other players and send messages out to the PCs of the other players. A typical rate will be ten time per second for a time period of 100ms. The messages sent between the PCs would contain information that was needed to keep the game consistent between all of the PCs. In a game that created the illusion of a spatial environment where each player could move, the packets could contain information about the new positions of the players as they moved. Today there are many commercial example of PC games that can be played between multiple players on Local Area Networks (LANs) or by two players over dial-up phone lines using modems. The network messages sent by such games contain a wide variety of information specific to the game. This can include position and velocity information of the objects in the game along with special actions taken by a player that effect the other players in the game.

The case of a two player game played over a modem is particularly simple. If the message rate is 10 messages per second, each PC sends 10 messages per second to the other PC and receives 10 messages per second. The delay introduced by the modems and phone line is small and will not be noticed in most games. Unfortunately, the case of two players is uninteresting for networked interactive applications. With the same game played with 8 players on a LAN, the message rate increases. Each PC must send 7 messages, one to

4

each of the other 7 players every time period and will receive 7 messages from the other players in the same time period. If the messaging time period is 100ms, the total message rate will be 70 messages sent per second and 70 messages received per second. As can be seen the message rate increases linearly with the number of players in the game. The message rates and data rates supported by popular LANs are high enough to support a large number of players at reasonable message sizes. Unfortunately, LANs are only deployed in commercial applications and cannot be considered for deploying a networked interactive application to consumer users.

The wide area networks available today to consumer users all must be accessed through dial-up phone lines using modems. While modem speeds have increased rapidly, they have now reached a bit rate of 28.8 Kbits/sec which is close to the limit set by the signal-to-noise ratio of conventional phone lines. Further speed increases are possible with ISDN, but this technology is not ready for mass market use. Other new wide area networking technologies are being discussed that would provide much higher bandwidth, but none are close to commercial operation. Therefore, in deploying a networked, interactive application to consumers, it is necessary to do so in a way that operates with existing networking and communications infrastructures.

In the example of the 8 player networked game, consider a wide area network implementation where the PCs of each of the players is connected to the network with a 28.8 Kbit/sec modem. Assume that the network used in this example is the Internet so that all of the network protocols and routing behavior is well defined and understood. If the game uses TCP/IP to send its messages between the PCs in the game, the PPP protocol over the dial-up phone lines can be advantageously used to compress the TCP/IP headers.

Even so, a typical message will be approximately 25 bytes in size. Sent through the modem, this is 250 bits. The messages are sent 10 times per second to each of the other PCs in the game and received 10 times per second from the other PCs. This is 35.0 Kbits/sec which exceeds the capabilities of the modem by 20%. If the messages are reduced to 20 bytes, just 8 players can be supported, but this approach clearly cannot support networked interactive applications with large numbers of participants. There are other problems beyond just the bandwidth of the network connection. There is the loading on each PC caused by the high packet rates and there is the latency introduced by the time needed to send all of the outbound packets. Each packet sent or received by a PC will require some amount of processing time. As the packet rate increases with the number of players in the game, less and less of the processor will be available for running the game software itself. Latency is important in an interactive application because it defines the responsiveness of the system. When a player provides a new input on their system, it is desirable for that input to immediately affect the game on all of the other players systems. This is particularly important in any game where the game outcome depends on players shooting at targets that are moved by the actions of the other players. Latency in this case will be the time from when a player acts to move a target to the time that the target has moved on the screens of the other players in the game. A major portion of this latency will come from the time needed to send the messages to the other seven players in the game. In this example the time to send the messages to the other 7 players will be approximately 50 ms. While the first player of the seven will receive the message quickly, it will not be until 50 ms have passed that the last player of the seven will have received the message.

6

Internet Protocol Multicasting

As mentioned before, the Internet is a widely known example of a wide area network. The Internet is based on a protocol appropriately called the Internet Protocol (IP). In the OSI reference model for layers of network protocols, IP corresponds to a layer 3 or Network layer protocol. It provides services for transmission and routing of packets between two nodes in an internet. The addressing model provides a 32 bit address for all nodes in the network and all packets carry source and destination addresses. IP also defines the routing of packets between network links in an inter-network. Gateways and routers maintain tables that are used to lookup routing information based on the destination addresses of the packets they receive. The routing information tells the gateway/router whether the destination of the packet is directly reachable on a local network link connected to the gateway/router or if not, the address of another gateway/router on one of the local network links to which the packet should be forwarded. On top of IP are the layer 4 transport protocols TCP and UDP. UDP provides datagram delivery services to applications that does not guarantee reliable or in-order delivery of the datagrams. TCP is a connection oriented service to applications that does provide reliable delivery of a data stream. It handles division of the stream into packets and ensures reliable, in-order delivery. See the Internet Society RFCs: RFC-791 "Internet Protocol", RFC-793 "Transmission Control Protocol" and RFC-1180 "A TCP/IP Tutorial". IP, TCP and UDP are unicast protocols: packets, streams or datagrams are transmitted from a source to a single destination.

As an example, consider Figures 1 and 2. Figure 1 shows a conventional unicast network with hosts 1, 2, 3 and 4 and network links 11, 12, 13, 14,

7

15,16,17, 18 and 19 and routers 5, 6, 7, 8, 9 and 10. In this example, each host wants to send a data payload to each of the other hosts. Host 1 has network address A, host 2 has network address C, host 3 has network address B and host 4 has network address D. Existing network protocols are typically based on packet formats that contain a source address, destination address and a payload. This is representative of commonly used wide area network protocols such as IP. There are other components in an actual IP packet, but for sake of this example, only these items will be considered. Figure 2 shows the example packets that are sent by the hosts to one another using a conventional unicast network protocol such as IP. Host 1 send packets 20, to host 3, packet 21 to host 2 and packet 22 to host 4. Host 1 wants to send the same data P1 to each of the other three hosts, therefore the payload in all three packets is the same. Packet 20 travels over network links 11, 12, 15 and 18 and through routers 5, 6, and 8 to reach host 3. In a similar fashion host 3 sends packets 23 to host 1, packet 24 to host 2 and packet 25 to host 4. Host 2 and host 4 send packets 26, 27, 28 and 29, 30, 31 respectively to the other three hosts. All of these packets are carried by the unicast network individually from the source host to the destination host. So in this example each host must send three packets and receive three packets in order for each host to send its payload to the other three hosts.

As can be seen, each host must send a packet to every other host that it wishes to communicate with in an interactive application. Further, it receives a packet from every other host that wishes to communicate with it. In an interactive application, this will happen at a regular and high rate. All of the hosts that wish to communicate with one another will need to send packets to each other eight to ten times per second. With four hosts communicating with

8

one another as in this example, each host will send three messages and receive three messages eight to ten times per second. As the number of hosts in the application that need to communicate with one another grows, the message rate will reach a rate that cannot be supported by conventional dial-up lines.

5 This makes unicast transport protocols unsuitable for delivering interactive applications for multiple participants since their use will result in the problem of high packet rates that grow with the number of participants.

Work has been done to attempt to extend the IP protocol to support

10 multicasting. See RFC-1112 "Host Extensions for IP Multicasting". This document describes a set of extensions to the IP protocol that enable IP multicasting. IP multicasting supports the transmission of a IP datagram to a host group by addressing the datagram to a single destination address. Multicast addresses are a subset of the IP address space and identified by class

15 D IP addresses - these are IP addresses with "1110" in the high order 4 bits. The host group contains zero or more IP hosts and the IP multicasting protocol transmits a multicast datagram to all members of the group to which it is addressed. Hosts may join and leave groups dynamically and the routing of multicast datagrams is supported by multicast routers and gateways. It is

20 proper to describe this general approach to multicast messaging as "distributed multicast messaging". It is a distributed technique because the job of message delivery and duplication is distributed throughout the network to all of the multicast routers. For distributed multicast messaging to work in a wide area network, all of the routers handling datagrams for multicast hosts must support

25 the routing of multicast datagrams. Such multicast routers must be aware of the multicast group membership of all of the hosts locally connected to the

9

router in order to deliver multicast datagrams to local hosts. Multicast routers must also be able to forward multicast packets to routers on their local network links. Multicast routers must also decide to which if any local routers they must forward multicast datagrams. When a multicast datagram is received, by
5 a multicast router, its group address is compared to a list for each local multicast router of group addresses. When there is a match, the datagram is then forwarded to that local multicast router. Therefore, the multicast routers in the network must maintain an accurate and up to date list of group addresses for which they are to forward datagrams to. These lists are updated when
10 hosts join or leave multicast groups. Hosts do this by sending messages using Internet Group Management Protocol (IGMP) to their immediately- neighboring multicast routers. A further attribute of distributed multicast messaging is that the routers must propagate the group membership information for a particular group throughout the network to all of the other
15 routers that will be forwarding traffic for that group. RFC-1112 does not describe how this is to be done. Many different approaches have been defined for solving this problem that will be mentioned later in descriptions of related prior art. Despite their differences, all of these approaches are methods for propagation of multicast routing information between the multicast routers and
20 techniques for routing the multicast datagrams in an inter-network supporting distributed multicast messaging.

The distributed multicast messaging approach has a number of undesirable side effects. The process of propagation of group membership information to all of the relevant routers is not instantaneous. In a large complex network it
25 can even take quite a period of time depending on the number of routers that must receive that updated group membership information and how many

10

routers the information for the group membership update must past through. This process can easily take many seconds and even minutes depending on the specifics of the algorithm that is used. RFC-1112 mentions this problem and some of the side effects that must be handled by an implementation of a practical routing algorithm for multicast messaging. One problem results when groups are dynamically created and destroyed. Since there is no central authority in the network for assigning group addresses, it is easily possible in a distributed network for there to be duplication of group address assignment. This will result in incorrect datagram delivery, where hosts will receive unwanted datagrams from the duplicate group. This requires a method at each host to filter out the unwanted datagrams. Another set of problems result from the time delay from when a group is created, destroyed or its membership changed to when all of the routers needed to route the datagrams to the member hosts have been informed of these changes. Imagine the case where Host N joins an existing group by sending a join message to its local router. The group already contains Host M which is a number of router hops away from Host N in the network. Shortly after Host N has sent it join message, Host M sends a datagram to the group, but the local router of Host M has not yet been informed of the change in group membership and as a result the datagram is not forwarded to one of the particular network links connected to the local router of Host M that is the only path in the network from that router that ultimately will reach Host N. The result is that Host N will receive no datagrams addressed to the group from Host M until the local router of M has its group membership information updated. Other related problems can also occur. When a host leaves a group, messages addressed to the group will continue for some time to be routed to that host up to the local router of that

11

host. The local router will know at least not to route the datagram onto the local network of that host. This can still result in a great deal of unnecessary datagrams being carried in a large network when there are many active message groups with rapidly changing memberships.

5 Finally, distributed multicast messaging does not sufficiently reduce the message rate between the hosts. With distributed multicast messaging, each host need only send one message addressed to the message group in order to send a message to all of other hosts in the group. This is an improvement over conventional unicast messaging where one message would need to be sent to
10 each of the other hosts in a group. However, distributed multicast messaging does nothing to reduce the received message rate at each of the hosts when multiple hosts in a group are sending messages to the group closely spaced in time. Let us return to the example of a group of ten hosts sending messages seven times per-second to the group. With conventional unicast messaging,
15 each host will need to send 9 messages to the other hosts, seven times per-second and will receive 9 messages, seven times per-second. With distributed multicast messaging, each host will need to send only one message to the group containing all of the hosts seven times per-second, but will still receive 9 messages, seven times per-second. It is desirable to further reduce the number
20 of received messages.

 An example of distributed multicasting is shown in Figures 3 and 4. Figure 3 shows a network with multicast routers 39, 40, 41, 42, 43 and 44 and hosts 35, 36, 37, 38 and network links 45, 46, 47, 48, 49, 50, 51, 52 and 53. The four hosts have unicast network addresses **A**, **B**, **C**, **D** and are also all members
25 of a message group with address **E**. In advance the message group was created and each of the hosts joined the message group so that each of the multicast

12

routers is aware of the message group and has the proper routing information. A network protocol such IP with multicast extensions is assumed to be used in this example. Host 35 sends packet 54 with source address A and destination multicast address E to the entire message group. In the same manner host 37
5 sends packet 55 to the group, host 36 sends packet 56 to the group and host 38 sends packet 57 to the group. As the packets are handled by the multicast routers they are replicated as necessary in order to deliver them to all the members of the group. Let us consider how a packets sent by host 35 is ultimately delivered to the other hosts. Packet 54 is carried over network link
10 45 to multicast router 39. The router determines from its routing tables that the multicast packet should be sent onto network links 46 and 47 and duplicates the packet and sends to both of these network links. The packet is received by multicast routers 40 and 43. Multicast router 43 sends the packet onto network link 50 and router 40 sends its onto links 48 and 49. The packet
15 is then received at multicast routers 44, 42 and 41. Router 41 sends the packet over network link 51 where it is received by host 36. Router 42 sends the packet over network link 52 to host 37 and router 44 sends the packet over link 53 to host 38. A similar process is followed for each of the other packets sent by the hosts to the multicast group E. The final packets received by each
20 host are shown in Figure 4.

While distributed multicasting does reduce the number of messages that need to be sent by the hosts in a networked interactive application, it has no effect on the number of messages that they receive. It has the further disadvantages of poor behavior when group membership is rapidly changing
25 and requires a special network infrastructure of multicast routers. It also has no support for message aggregation and cannot do so since message delivery is

13

distributed. Distributed multicasting also has no support for messages that define logical operations between message groups and unicast host addresses.

5 All of these problems can be understood when placed in context of the design goals for distributed multicast messaging. Distributed multicast messaging was not designed for interactive applications where groups are rapidly created, changed and destroyed. Instead it was optimized for applications where the groups are created, changed and destroyed over relatively long time spans perhaps measured in many minutes or even hours. An example would be a video conference where all the participants agreed to connect the conference at a particular time for a conference that might last for 10 an hour. Another would be the transmission of an audio or video program from one host to many receiving hosts, perhaps measured in the thousands or even millions. The multicast group would exist for the duration of the audio/video program. Host members would join and leave dynamically, but in 15 this application it would be acceptable for there to be a significant time lag from joining or leaving before the connection was established or broken.

While IP and multicast extensions to IP are based on the routing of packets, another form of wide area networking technology called Asynchronous Transfer Mode (ATM) is based on switching fixed sized cells through switches. 20 Unlike IP which supports both datagram and connection oriented services, ATM is fundamentally connection oriented. An ATM network consists of ATM switches interconnected by point-to-point links. The host systems are connected to the leaves of the network. Before any communication can occur between the hosts through the network, a virtual circuit must be setup across 25 the network. Two forms of communication can be supported by an ATM network. Bi-directional point-to-point between two hosts and point-to-

14

5 multipoint in one direction from one host to multiple hosts. ATM, however,
does not directly support any form of multicasting. There are a number of
proposals for layering multicasting on top of ATM. One approach is called a
multicast server, shown in Figure 8. Host systems 112, 113, 114, 115 setup
point-to-point connections 106, 107, 108 and 109 to a multicast server 105.
ATM cells are sent by the hosts to the multicast server via these links. The
multicast server sets up a point-to-multipoint connection 111 to the hosts
which collectively constitute a message group. Cells sent to the server which
are addressed to the group are forwarded to the point-to-multipoint link 111.
10 The ATM network 110 is responsible for the transport and switching for
maintaining all of the connections between the hosts and the server. The cells
carried by the point-to-multipoint connection are duplicated when necessary by
the ATM switches at the branching points in the network tree between and
forwarded down the branching network links. Therefore, the network is
15 responsible for the replication of the cells and their payloads, not the server.
This method has the same problems as distributed multicasting when used for
an interactive application. Each host still receives individual cells from each of
the other hosts, so there is no aggregation of the payloads of the cells targeted
at a single host. There is no support for addressing cells to hosts based on
20 logical operations on the sets of members of host groups.

Related Prior Art

There are a number of existing patents and European patent applications
that are related to the area of the invention. These can be organized into two
separate categories: multicast routing/distribution and source to destination
25 multicast streams.

15

Multicast routing and distribution

These patents are US 4,740,954 by Cotton et al, US 4,864,559 by Perlman, US 5,361,256 by Doeringer et al, US 5,079,767 by Perlman and US 5,309,433
5 by Cidon et al. Collectively these patents cover various algorithms for the routing and distribution of the datagrams in distributed multicast networks. None deal with the problems described previously for this class of multicast routing and message distribution such as poor behaviors when the message groups change rapidly. In all of these patents, messages are transmitted from a
10 host via a distributed network of routers to a plurality of destination hosts which are members of a group. Since these patents deal only with variants of distributed multicasting they provide no means to reduce the received message rate, no method to aggregate messages and provide no method in the messages to perform logical operation on message groups.

15 Source to destination multicast streams

These are PCTs and a European patent application. They are EP 0 637 149 A2 by Perlman et al, PCT/US94/11282 by Danneels et al and PCT/US94/11278 by Sivakumar et al. These three patent applications deal
20 with the transmission of data streams from a source to a group of destinations. In none of these patent applications, is a method described for transmitting data between multiple members of a group. In all of these applications, the data transmission is from a source to a plurality of designations. Since these patent applications deal only with point-to-multipoint messaging, they can provide no means to reduce the received message rate, no method to aggregate messages
25 and provide no method in the messages to perform logical operation on message groups.

16

SUMMARY OF THE INVENTION

The present invention relates to facilitating efficient communications between multiple host computers over a conventional wide area communications network to implement an interactive application such as a computer game between multiple players. In such an application, the hosts will be dynamically sending to each other information that the other hosts need in order to keep the interactive application operating consistently on each of the hosts. The invention is comprised of a group messaging server connected to the network that maintains a set of message groups used by the hosts to communicate information between themselves. The invention further comprises a server-group messaging protocol used by the hosts and the server. The server-group messaging protocol is layered on top of the Transport Level Protocol (TLP) of the network and is called the Upper Level Protocol (or ULP). In the OSI reference model the ULP can be thought of as a session layer protocol built on top of a transport or applications layer protocol. The ULP protocol uses a server-group address space that is separate from the address space of the TLP. Hosts send messages to addresses in the ULP address space to a group messaging server using the underlying unicast transport protocol of the network. The ULP address space is segmented into unicast addresses, implicit group messaging addresses and logical group messaging addresses. The implicit and logical group messaging addresses are collectively called group messaging addresses.

Host systems must first establish connections to a group messaging server before sending messages to any ULP addresses. The process of establishing this connection is done by sending TLP messages to the server. The server establishes the connection by assigning a unicast ULP address to the host and

17

returning this address in an acknowledgment message to the host. Once connected, hosts can inquire about existing message groups, join existing message groups, create new message groups, leave message groups they have joined and send messages to ULP addresses known by the server. Each message group is assigned either an implicit or logical ULP address depending on its type.

Figure 5 shows an example of a wide area network with a group messaging server ("GMS"). Hosts 58 has TLP address A and ULP address H, host 59 has TLP address C and ULP address J, host 60 has TLP address B and ULP address I and host 61 has TLP address D and ULP address K. The network is a conventional unicast network of network links 69, 70, 71, 72, 73, 74, 75, 76, and 77 and unicast routers 63, 64, 65, 66, 67, and 68. The group messaging server 62 receives messages from the hosts addressed to a message group and send the contents of the messages to the members of the message group.

Figure 6 shows an example of datagrams sent from the hosts to a message group that they are members of. As before, a TLP such as IP (where the message header contain the source and destination TLP addresses) is assumed to be used here. Host 58 sends message 80 which contains the TLP source address A of the host and the destination TLP address S for the GMS 62. The destination ULP address G is an implicit ULP address handled by the GMS and the payload P1 contains both the data to be sent and the source ULP address H of the host. It is assumed that prior to sending their ULP messages to the GMS, that each host as already established a connection to the GMS and joined the message group G. Host 60 sends message 81 with payload P2 containing data and source ULP address I. Hosts 59 sends message 82 with payload P3 containing data and source ULP address J. Host 61 sends message

18

83 with payload P4 containing data and source ULP address K. The GMS receives all of these messages and sees that each message is addressed to implicit message group G with members H, I, J, and K. The GMS can either process the message with or without aggregating their payloads. Figure 6 shows the case where there is no aggregation and Figure 7 shows the case with aggregation.

Without aggregation, the GMS generates the outbound messages 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, and 95 which it sends to the hosts. The datagrams have TLP headers with the source and destination TLP addresses of the GMS and the hosts respectively. The next field in the datagrams is the destination ULP of the datagram. Datagrams 84, 85, and 86 are sent to host 58 with TLP address A and ULP address H. Datagrams 87, 88, and 89 are sent to host 60 with TLP address B and ULP address I. Datagrams 90, 91 and 92 are sent to host 59 with TLP address C and ULP address J. Datagrams 93, 94 and 95 are sent to host 61 with TLP address D and ULP address K respectively. As can be seen from the payloads that each host has received, each host has received the payloads from the other three hosts. Note that each host has not received a copy of its own original message. This is because the GMS has performed echo suppression. This is selectable attribute of the GMS since in some applications it is useful for the hosts to receive and echo of each message that they send to a group that they are also members of. In the example of Figure 6, it has been shown how the present invention can achieve the same message delivery as distributed multicasting without its disadvantages. Without aggregation, the present invention enables a host to send a single message to multiple other hosts that are members of a message group. It reduces the message traffic that a host must process in an interactive

19

application by reducing the number of messages that each host must send to the others. Without aggregation, however, there is no reduction in the number of messages received by the hosts. Without aggregation we can achieve the same message rate as distributed multicasting without the need for a network with
5 multicast routers, we can use a conventional unicast network such as the Internet. The present invention also avoids the problems that dynamic group membership causes for distributed multicasting. Group membership can be changed very rapidly. Groups can be created, joined and left by single unicast messages from hosts to the GMS. These messages will be point-to-point
10 messages and will not have to propagate in throughout the network nor have to cause routing table changes in the routers. This ability to rapidly and accurately change group membership is critical to the implementation of networked interactive applications. Consider a computer game for multiple players that supports hundreds of players that are spread throughout a three
15 dimensional space created by the game. At any time only a few players will be able to see and effect one another in the game since other players will be in other areas that are out of sight. Using conventional phone lines to carry the data from each players computer to the network, it will not be possible to send all actions of each player to all of the other players, but because only a few
20 players will be in close proximity at any one time, it will not be necessary to do so. It is only necessary to send data between the players that are in close proximity to one another. These "groups" of players naturally map onto the message groups of the invention. As players move about the three dimensional space of the game, game will cause them to join and leave message groups as
25 necessary. If this does not happen rapidly it will limit the interactivity of the game or cause inconsistent results for the different players in the game.

70

The invention also allows aggregating message payloads of multiple messages destined to a single host into a single larger message. This can be done because of the GMS where all of the messages are received prior to being sent to the hosts. Figure 7 shows an example of how this works. The hosts
5 send their messages to the GMS in exactly the same fashion as in Figure 6 using the same addresses previously defined in Figure 5. Host 58 sends message 96, host 60 sends message 97, host 59 sends message 98 and host 61 sends message 99. The GMS receives all of these messages and creates four
10 outbound messages 100, 101, 102 and 103. The process by which these messages will be explained in detail in the detailed description of the invention. Each message is destined to a single host and contains an aggregated payload with multiple payload items. Message 100 has a destination ULP address **H** for host 58 and aggregated payload P2, P3 and P4 from the messages from hosts
15 59, 60 and 61. Message 101 is targeted at host 60, message 102 is targeted at host 59 and message 103 is targeted at host 61. As can be seen, each host sends one message and receives one message. The received message is longer and contains multiple payloads, but this is a significant improvement over receiving multiple messages with the wasted overhead of multiple message
20 headers and message processing time. Overall the invention has dramatically reduced the amount of data that must be sent and received by each host. Since the bit rate over conventional phone lines using a modem is low, a reduction in the amount of data that must be sent and received directly translates into improved time and latency for message communications between the hosts.

Hosts create, join and leave message groups using control messages in the
25 ULP protocol to the GMS. Hosts may also read and write application specific state information that is stored in the GMS. When hosts send messages to

21

other hosts, the message must be at least addressed to an implicit group address. The ULP implicit address will always be the primary address in a message from one host to another. The message may optionally specify auxiliary destination addresses. In many cases the implicit ULP address will be the only destination ULP address in the message. The GMS will handle delivery of the ULP messages addressed to the implicit message group to all of the hosts that are members of the group. A ULP send message may optionally specify an address list of auxiliary addresses in addition to the primary destination of the implicit ULP address. This auxiliary address list can contain only unicast and logical ULP addresses. The address list can also specify set operators to be performed between the sets of host ULP addresses defined by the unicast addresses and logical groups. Once the address list has been processed to yield a set of hosts, this set is intersected with the set of hosts that are members of the implicit message group specified by the primary implicit ULP address in the message. This ability to perform logical set operators on message groups is very useful in interactive applications. It allows a single ULP message to selectively deliver a message to hosts that fit a set of computed criteria without the sending host having to know anything about the members of the groups in the address list. Recall the example of a networked game with hundreds of players in a three dimensional environment created by the game. Consider an implicit message group consisting of all of the game players in a certain area of the game where all of the players can interact with one another. Consider that the players are organized into multiple teams. Logical message groups could be created for each team within the game. To send a message to all the players within the area that were on one team, a ULP message would be sent to the ULP implicit message group for all

22

the players in the area with an auxiliary address of the logical message group for all the players on the selected team. The GMS would perform the proper set intersection prior to sending the resulting messages to the targeted hosts. The result of this will be that the message will only be delivered to the players
5 on the selected team in the selected area of the game.

In summary, the present invention deals with the issues of deploying an interactive application for multiple participants on wide area networks by providing a method for reducing the overall message rate and reducing latency. This invention uses a server group messaging approach, as oppose to the above
10 described "distributed multicast messaging" approach. The present invention overcomes the undesirable side effects of the distributed multicast messaging approach. Further, it reduces the message rate between the hosts. As pointed out in an example discussed above, with prior art distributed multicast messaging, each host will need to send only one message to the group
15 containing all of the hosts seven times per-second, but will still receive 9 messages, seven times per-second. The present invention of server group messaging has each host sending one message, seven times per-second and receiving one message, seven times per-second.

The present invention is different from the multicast routing and
20 distribution method disclosed in U.S. Patent Nos. 4,740,954, 4,864,559, 5,361,256, 5,079,767 and 5,309,433. Since these patents deal only with variants of distributed multicasting they provide no means to reduce the received message rate, no method to aggregate messages and provide no method in the messages to perform logical operation on message groups. This
25 differs from the present invention where messages from multiple hosts

23

addressed to a message group are received by a group server which processes the contents of the messages and transmits the results to the destination hosts.

The present invention is also different from the source to destination multicast streams approach disclosed in EP 0 637 149 A2, PCT/US94/11282
5 and PCT/US94/11278. In all of these references, the data transmission is from a source to a plurality of designations, whereas the present invention describes data transmission from a sending host to a server host system and then from the server host to the destination hosts.

These and other features and advantages of the present invention can be
10 understood from the following detailed description of the invention together with the accompanying drawings.

DESCRIPTION OF DRAWINGS

Figure 1 shows a conventional unicast network consisting of hosts,
network links and routers.

15 Figure 2 shows the unicast datagrams on a conventional unicast network that would be needed to implement an interactive application between four hosts.

Figure 3 shows a prior art multicast network consisting of hosts, network links and multicast routers.

20 Figure 4 shows a multicast datagrams on a prior art multicast network that would be needed to implement an interactive application between four hosts.

Figure 5 shows a unicast network equipped with a group messaging server in accordance with the present invention.

25 Figure 6 shows the ULP datagrams without payload aggregation on a network according to the present invention that would be needed to implement an interactive application between four hosts.

24

Figure 7 shows the ULP datagrams with payload aggregation on a network according to the present invention that would be needed to implement an interactive application between four hosts.

Figure 8 shows a prior art ATM network with a multicast server.

5 Figure 9 shows the detailed datagram format and address format for ULP messages in accordance with the present invention.

Figure 10 shows the internal functions of the GMS according to the present invention.

10 Figure 11 shows the host software interface and functions needed to support the ULP according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a method for multiple host computers to efficiently communicate information to one another over a wide area network for the purposes of implementing an interactive application between multiple users. The method consists of three components: a host protocol interface, a protocol and a server. The protocol is between the host protocol interface and the server and is implemented on top of the network transport protocol of a wide area network. The protocol is called the Upper Level Protocol (ULP) since it is layered above the existing network Transport Level Protocol (TLP).
15 In the OSI reference model the protocol can be described as a Session Layer protocol on top of the Transport Layer of the network. Figure 11 shows the host protocol interface, 151, relative to the interactive application, 150, and the host interface for the Transport Level Protocol, 153. The network interface, 155, provides the physical connection for the host to the network. The
20 network communications stack, 154, is the communications protocol stack that provides network transport services for the host and the host interface for the
25

25

Transport Level Protocol, 153, is an interface between host application software and the network transport services of the network communications stack.

5 The interactive application can send and receive conventional network messages using the host interface to the TLP. The interactive application also can send and receive ULP messages through the host interface for the ULP. Internal to the host interface for the ULP is a table, 152, of all ULP addresses which the host can send messages to. Each entry in the table contains a pair of addresses, a ULP address and its corresponding TLP address. When the host
10 sends a message to a ULP address, that message is encapsulated in a TLP message sent to the TLP address corresponding to that ULP address. This allows the ULP messages to be handled transparently by the transport mechanisms of the existing network. A core function of the ULP is group messaging where hosts send messages to message groups populated by
15 multiple hosts. This allows a host to send a message to multiple hosts with one ULP message. Since the ULP is layered on top of the TLP, the group messaging functions of the ULP operate on a conventional unicast network where TLP messages can only be sent from one host to only one other host.

20 The group based messaging is implemented through the use of a server called a group messaging server. All ULP messages from the hosts are sent from the hosts to a group messaging server using the TLP protocol. The server processes the ULP portion of the messages and takes the necessary required by the ULP message. Control ULP messages are processed locally by the server and may be acknowledged to the sending host. ULP messages
25 addressed to other hosts are processed by the group messaging server and then

ULP

re-transmitted to the proper ULP destination hosts, again using the TLP protocol to encapsulate and transport these messages.

5 In Figure 5, hosts 58, 59, 60 and 61 send messages to one another using the ULP over a conventional unicast network using a group messaging server
62. The network consists of conventional routers 63, 64, 65, 66, 67 and 68
10 connected with conventional network links 69, 70, 71, 72, 73, 74, 75, 76 and 77. Host 58 can send a message to hosts 59, 60 and 61 by sending a single ULP message to the group messaging server 62 where the ULP message specifies a destination address that is a ULP message group. The ULP
15 message is encapsulated in a TLP message addressed to the group messaging server. This causes the message to be properly routed by router 63 to network link 71 to router 67 to the server 62. The group messaging server receives the ULP message and determines that the message is addressed to a message group containing hosts 59, 60 and 61 as members. The server sends the payload of
20 the received message to each of the hosts in three new ULP messages individually sent to the three hosts. Since each message is encapsulated in a TLP message, the messages are properly carried over the conventional unicast network. The first ULP message is sent by the group messaging server to host 61. This message is carried by network links 71, 70, 72 and 75 and routers 67, 63, 64 and 65. The second ULP message is sent by the group messaging server to host 60. This message is carried by network links 71, 70, 73 and 76 and routers 67, 63, 64 and 66. The third ULP message is sent by the group messaging server to host 61. This message is carried by network links 74 and 77 and routers 67 and 68.

The invention can be implemented both in a datagram form and in a connection oriented form. To best understand the details of the invention, it is best to first consider a datagram implementation.

Datagram Transport Implementation

5 The ULP can be implemented as a datagram protocol by encapsulating addresses, message type information and the message payload within a datagram of the underlying network transport protocol. The general form of the ULP datagram message format is shown in Figure 9 as elements 123, 124, 125, 126, 127, 128 and 129. The transport header 123 is the datagram header of the TLP that is encapsulating the ULP datagram. The ULP message type field 124 indicates whether it is a send or receive message, if it is a control message or a state message. The following table shows the different message types. The ULP message type field must be present in a ULP datagram.

15

T280X

20

Message Types	
1	Send
2	Receive
3	Send Control
4	Receive Control
5	Send State
6	Receive State

25

Send messages are always sent from a host to a group messaging server. Messages from a group server to the hosts are always receive messages. Send Control messages are messages from hosts to a group messaging server requesting a control function be performed. Receive Control messages are acknowledgments from a group messaging server to the hosts in response to a

28

prior Send Control messages. The Send and Receive State messages are special cases of the Send and Receive Control messages that allow hosts to read and write application specific state storage in the group messaging server. The specific control functions supported by the ULP will be explained later.

5 The destination ULP address 125 is required in ULP datagrams and specifies the primary destination of the ULP message. The address count field 126 is required in ULP send message types and is not present in ULP receive message types. When the address count field in a ULP send message is non-zero, it specifies the number of auxiliary destination addresses for the send
10 message that follow the address count field. These auxiliary destination addresses are shown as items 127 and 128, but it is understood that there are as many auxiliary ULP destination addresses as specified by the address count field. Finally there is the payload 129.

15 The payload format for ULP datagrams is defined by items 116, 117, 118, 119, 120, 121 and 122. Item 116 is the message count and defines how many payload elements will be contained in the payload. A single payload element consists of a triplet of source ULP address, data length and data. Items 117, 118 and 119 comprise the first payload element of the payload. Item 117 is the ULP address of the source of the payload element, item 118 is the data length
20 for the data in the payload element and item 119 is the actual data. Items 120, 121 and 122 comprise the last payload element in the payload. ULP send messages only support payloads with a single payload element, so the message count is required to be equal to one. ULP receive messages may have payloads with one or more payload elements.

ULP Address Space

The address space of the ULP is divided into three segments: unicast host addresses, implicit group addresses and logical group addresses. All source and destination addresses in ULP must be in this address space. The ULP address space is unique to a single group messaging server. Therefore each group messaging server has a unique ULP address space. Multiple group messaging servers may be connected to the network and hosts may communicate with multiple group messaging servers without confusion since each ULP datagram contains the header of the TLP. Different group messaging servers will have unique TLP addresses which can be used by the hosts to uniquely identify multiple ULP address spaces. The format for ULP addresses is shown in Figure 9 comprised of items 130, 131 and 132. The address format field 130 is a variable length field used to allow multiple address lengths to be supported. The address type field 131 indicates the type of ULP address: unicast host, implicit group or logical group. The encoding is as follows:

T300X₂₀

<u>Address Type Encoding</u>	
0 0	Unicast Host Address
0 1	Unicast Host Address
1 0	Implicit Group Address
1 1	Logical Group Address

The address format encoding determines the length of the address field and therefore the total length of the ULP address. This encoding is shown below. Note that when the address type specifies a unicast host address, the low bit of the address type field is concatenated to the address field to become the most significant bit of the address. This doubles the size of the address space for

unicast host addresses which is useful since there will generally be more hosts than group messaging servers.

T310X⁵

<u>Address Format Encoding</u>	
0	29 Bit Address Field
1 0	4 Bit Address Field
1 1 0	11 Bit Address Field

10 ULP unicast host addresses are assigned to each host when it first connects to a group messaging server. When a host sends a message to other ULP address, the unicast ULP address of the host will appear as the source ULP address in the received payload element. Unicast ULP host addresses can also be used as destination addresses only as auxiliary addresses in a ULP send message. They are not allowed to be used to as the primary ULP destination address. This means that hosts cannot send ULP directly to one another, but 15 always must send the messages to one another through a group messaging server.

20 Implicit group addresses are created by a group messaging server in response to a control message to the server requesting the creation of an implicit message group. The host requesting the creation of the implicit message group becomes a member of the message group when it is created. Other hosts can send inquiry control messages to the group messaging server to learn of its existence and then send a implicit group join message in order to join the group. The group messaging server maintains a list of ULP addresses of hosts that are members of the implicit message group. Implicit ULP group 25 addresses are the only ULP addresses allowed to be the primary destination of a ULP send message. Implicit ULP addresses will never appear as ULP source addresses in a payload element.

Logical ULP addresses are used both to address logical message groups and for specifying set operations between the group members of the auxiliary ULP addresses in a ULP send message. Logical message groups are created and joined similarly to implicit message groups, however, logical ULP
5 addresses may only be used as auxiliary ULP addresses in a ULP send message. Logical ULP addresses will also never appear as source ULP addresses in a payload element. The support of set operations between message groups as part of a ULP send message will be explained in a later section on ULP send messages.

10 **Group Messaging Server Internal Functions**

The internal components of the group messaging server are shown in Figure 10.

In the preferred embodiment, the group messaging server is a general purpose computer system with a network interface to connect it to a wide area
15 network. Item 135 is the network interface for the group messaging server and includes not only the hardware connection to the network but the communications protocol stack used to implement the TLP on the server.

Item 136 is an overall control function for the group messaging server. This control function is responsible for all ULP messages that are sent or
20 received by the GMS. Internal to this control function are several important storage and processing functions. Item 137 is an address map for all hosts currently connected to the GMS. This address map is a list of the ULP host address of each host connected to GMS and its corresponding TLP address. This enables the control function to construct the necessary TLP headers for
25 sending ULP messages to the hosts connected to the GMS. Item 138 is a list of all of the currently active implicit ULP addresses currently recognized by the

GMS. Item 139 is an application specific state storage and processing function. Many interactive applications deployed over a network will be able to be implemented solely with host based processing. In these cases all data that needs to be sent between the hosts can be transported using the ULP.

5 However, some applications will need maintain a centrally stored and maintained repository of application state information. This is useful when hosts may join or leave the application dynamically. When hosts join such an application, they will need a place from which they can obtain a snapshot of the current state of the application in order to be consistent with the other hosts
10 that already where part of the application. To read and write this state storage area, the ULP supports send and receive state message types. Within these messages, there is the ability to access a state address space so that different portions of the state can be individually accessed. Application specific processing of state written into this state storage area can also be implemented.

15 Items 140 and 141 are two of multiple ULP server processes running on the GMS. These are software processes that are at the heart of the ULP. Each implicit ULP addresses recognized by the GMS has a one-to-one correspondence to a ULP server process and to a message group maintained by the process. Since all ULP send messages must have an implicit ULP address
20 as the primary destination address of the message, every ULP send message is sent to and processed by a ULP server process. These processes are created by the GMS control function in response to ULP control messages to create new implicit ULP addresses. They are destroyed when the last host which is a member of its message group has left the message group. Internal to a ULP
25 server process is a list, 142, of the ULP host addresses of the members of the message group, a set of message queues 143 for each host which is a member

of the message group and a message aggregation function 149 which is used to aggregate multiple messages to a single host into a single message.

Item 145 maintains a list of all of the logical ULP addresses and message groups in the GMS. Items 144 and 146 represent two of multiple logical ULP addresses. For each logical ULP address, there is a corresponding list, 147 and 148 of the host ULP addresses of the members of the logical message group. The logical message groups are not tied to specific ULP server processes, but are global with a GMS to all of the ULP server processes.

Control Functions

The control functions consist of connect, disconnect, create group, close group, join group, leave group, query groups, query group members, query group attributes. These control functions are implemented by a ULP send and receive control messages. The control functions are initiated by a host sending a ULP send control message to a GMS. These messages only allow a primary ULP destination address in the message and do not allow auxiliary addresses. The primary ULP address is interpreted as a control address space with a unique fixed address assigned to each of the control functions enumerated above. The contents of data in the payload supplies any arguments needed by the control function. Returned values from the control function are returned in a ULP receive control message that is addressed to the host that sent the original control message for which data is being returned. The detailed operation of these control functions is described below.

Connect

This control function allows a host to connect to a GMS. The destination ULP address in the message is a fixed address that indicates the connect function. The source ULP address and any data in the payload are ignored.

34

Upon receiving this message, the GMS control function, 136, creates a new host address and enters the host address in the host address map 136 along with the source TLP address from the TLP header of the message. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a function code in the data portion of the payload that indicates successful host connection. The destination ULP address in the message is the ULP address assigned to the host. The host saves this and uses it for any future messages to the GMS. If there is an error, the control function returns a message to the host with a function code in the data portion of the payload indicating failed host connection.

Disconnect

This function allows a host to disconnect from a GMS. The destination ULP address in the message is a fixed address that indicates the disconnect function. The source ULP address is used to remove the host from membership in any implicit or logical groups prior to disconnecting. Any data in the payload is ignored. The GMS control function also removes the entry for the host from the host address map. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a function code in the data portion of the payload that indicates successful host disconnection. The destination ULP address in the message is the ULP address assigned to the host. If there is an error, the control function returns a message to the host with a function code in the data portion of the payload indicating failed host disconnection.

35

Create implicit group

This function allows a host to create a new implicit message group and associated implicit ULP address and server process. The payload in the message may contain a single payload item whose data field holds attributes of the group. These attributes can be used to define any optional functions of the group. The destination ULP address in the message is a fixed address that indicates the create implicit group function. The GMS control function allocates a new implicit ULP address, adds it to the implicit ULP address list 138 and creates a new ULP server process 140. The host that sends this message is added to the membership list of the implicit group. This is done by adding the source ULP address in the message to the group membership list 142 in the ULP server process. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a function code in the data portion of the payload that indicates successful implicit group creation. The source ULP address in the payload is the ULP address assigned to the new implicit group. If there is an error, the control function returns a message to the host with a function code in the data portion of the payload indicating failed implicit group creation.

Create logical group

This function allows a host to create a new logical message group and associated logical ULP address. The payload in the message may contain a single payload item whose data field holds attributes of the group. These attributes can be used to define any optional functions of the group. The destination ULP address in the message is a fixed address that indicates the create logical group function. The GMS control function allocates a new logical ULP address and adds it to the logical ULP address list 145. The host

36

that sends this message is added to the membership list of the logical group. This is done by adding the source ULP address in the message to the group membership list 147 for the new logical message group 144. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a function code in the data portion of the payload that indicates successful logical group creation. The source ULP address in the payload is the ULP address assigned to the new logical group. If there is an error, the control function returns a message to the host with a function code in the data portion of the payload indicating failed implicit group creation.

Join group

This function allows a host to join an existing logical or implicit message group. The destination ULP address in the message is a fixed address that indicates the join group function. The data portion of the payload contains the ULP address of the group that is to be joined. The GMS control function looks at this address and determines if it is an implicit or logical ULP address. If it is an implicit ULP address, the GMS control function finds the ULP server process selected by the address in the message payload and adds the source ULP host address from the message to the group membership list 142. If it is a logical ULP address, the GMS control function finds the logical ULP address 144 selected by the address in the message payload and adds the source ULP host address from the message to the group membership list 147. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a function code in the data portion of the payload that indicates successful group join. The source ULP address in the payload is the ULP address of the group that was joined. If

37

there is an error, the control function returns a message to the host with a function code in the data portion of the payload indicating failed implicit group creation.

Leave group

5 This function allows a host to leave an existing logical or implicit message group that it is a member of. The destination ULP address in the message is a fixed address that indicates the leave group function. The data portion of the payload contains the ULP address of the group that is to be left. The GMS control function looks at this address and determines if it is an implicit or
10 logical ULP address. If it is an implicit ULP address, the GMS control function finds the ULP server process selected by the address in the message payload and removes from the group membership list 142 the source ULP host address from the message. If the host is the last member of the group, the ULP server process is terminated and the implicit ULP address is de-allocated. If it
15 is a logical ULP address, the GMS control function finds the logical ULP address 144 selected by the address in the message payload and removes from the group membership list 147 the source ULP host address from the. If the host is the last member of the group, the ULP address is de-allocated. Upon successful completion, the GMS control function responds with a receive
20 control ULP message addressed to the host along with a function code in the data portion of the payload that indicates successful group leave. If there is an error, the control function returns a message to the host with a function code in the data portion of the payload indicating failed implicit group creation.

Query groups

25 This function allows a host to get a list of all implicit and logical message groups currently active on a GMS. The destination ULP address in the

message is a fixed address that indicates the query groups function. Any data portion of the payload is ignored. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a payload with multiple payload elements. The first payload
5 element contains a function code indicating successful query groups. The source ULP address in the first payload element is ignored. Each of the subsequent payload elements contain a ULP group address in the source address field of the payload element that is one of the active group addresses on the GMS. There is no data field in these subsequent payload elements. If
10 there is an error, the control function returns a message to the host with a function code in the data portion of a payload with a single payload element indicating failed query groups.

Query group members

This function allows a host to get a list of all hosts that are members of a
15 message group. The destination ULP address in the message is a fixed address that indicates the query group members function. The data portion of the payload carries the address of the message group for the query. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a payload with multiple
20 payload elements. The first payload element contains a function code indicating successful query group members. The source ULP address in the first payload element is ignored. Each of the subsequent payload elements contain a ULP host address in the source address field of the payload element that is one of the active group addresses on the GMS. There is no data field in
25 these subsequent payload elements. If there is an error, the control function

returns a message to the host with a function code in the data portion of a payload with a single payload element indicating failed query group members.

Query group attributes

5 This function allows a host to get a list of the attributes of a message group. The destination ULP address in the message is a fixed address that indicates the query group attributes function. The data portion of the payload carries the address of the message group for the query. Upon successful completion, the GMS control function responds with a receive control ULP message addressed to the host along with a payload with a two payload
10 elements. The first payload element contains a function code indicating successful query group members. The second payload element contains the attributes of the message group. If there is an error, the control function returns a message to the host with a function code in the data portion of a payload with a single payload element indicating failed query group attributes.

15 **Send Message Operation**

In order to fully understand the operations of the send message function, a number of individual cases are worth considering.

Single implicit destination

20 The most simple case is a send message to a single implicit ULP address. In all send message datagrams, the destination ULP address 125 must be an implicit ULP address. In this case of a single implicit destination, this is the only destination address in the datagram. The auxiliary address count 126 is zero and there are no auxiliary destination addresses 127 or 128. The payload consists of a message count 116 of one, the ULP of the host sending the
25 message in the source ULP address 117 and the data length 118 and data 119.

40

Send message datagrams may only have a single payload item so their message count field 116 must always be one.

The host sends the send message onto the network with a TLP header addressing the datagram to the GMS that is the selected target of the message.

5 The GMS receives the message and the GMS control function 136 determines that it is a send message datagram and looks up the implicit destination address in its implicit ULP address list 138. If the address does not exist, an error message is returned to the sending host with a ULP receive message datagram. If the address is valid, the GMS control function removes the TLP header from
10 the datagram and sends the ULP portion to the ULP server process corresponding to the destination implicit ULP address. Assume for discussion that this is the ULP server process 140. The ULP server process 140 will extract the single payload item from the message 117, 118 and 119 and place the payload item in each of the message queues 143. There will be one
15 message queue for each member of the message group served by the ULP server process 140. The members of the group will have their host ULP addresses listed in the host address list 142. Each message queue in a ULP server process will fill with payload items that are targeted at particular destination hosts. The mechanisms by which payload items are removed from
20 the queues and sent to the hosts will be described later.

Auxiliary unicast destination

In this case in addition to an implicit destination 125, there is also a single auxiliary address 127 in the datagram. The auxiliary address count 126 is one and the auxiliary destination addresses 127 is a unicast host ULP address. The
25 payload consists of a message count 116 of one, the ULP of the host sending

41

the message in the source ULP address 117 and the data length 118 and data 119.

The host sends the send message onto the network with a TLP header addressing the datagram to the GMS that is the selected target of the message.

5 The GMS receives the message and the GMS control function 136 determines that it is a send message datagram and looks up the implicit destination address in its implicit ULP address list 138 and the unicast host ULP auxiliary address in the host address map 137. If either of addresses does not exist, an error message is returned to the sending host with a ULP receive message datagram.

10 If the addresses are valid, the GMS control function removes the TLP header from the datagram and sends the ULP portion to the ULP server process corresponding to the destination implicit ULP address. Assume for discussion that this is the ULP server process 140. The ULP server process extracts the auxiliary ULP address from the message and determines from the address that

15 it is a unicast host ULP address. The server process then checks to see if this address is a member of the message group defined by the host address list 142. If it is not, no further action is taken and the payload item in the message is not placed in any of the message queues 143. If the host address is in the message

20 group, the payload item in the message is placed in the single message queue corresponding to that host. The net effect is that the ULP server process has performed a set intersection operation on the members of the message group selected by the implicit ULP destination address and defined by the group membership list 142 with the members of the set of hosts defined by the auxiliary address. The payload item is then sent only to the hosts that are

25 members of this set intersection.

42

Auxiliary logical destination

In this case in addition to an implicit destination 125, there is also a single auxiliary address 127 in the datagram. The auxiliary address count 126 is one and the auxiliary destination addresses 127 is a logical ULP address. The
5 payload consists of a message count 116 of one, the ULP of the host sending the message in the source ULP address 117 and the data length 118 and data 119.

The host sends the send message onto the network with a TLP header addressing the datagram to the GMS that is the selected target of the message.
10 The GMS receives the message and the GMS control function 136 determines that it is a send message datagram and looks up the implicit destination address in its implicit ULP address list 138 and the logical ULP auxiliary address in list of logical ULP addresses 145. If either of addresses does not exist, an error message is returned to the sending host with a ULP receive message datagram.
15 If the addresses are valid, the GMS control function removes the TLP header from the datagram and sends the ULP portion to the ULP server process corresponding to the destination implicit ULP address. Assume for discussion that this is the ULP server process 140. The ULP server process extracts the auxiliary ULP address from the message and determines from the address that
20 it is a logical ULP address. Assume for this example that this logical ULP address is the logical address 144. The server process fetches the group membership list 147 corresponding to the logical address and performs a set intersection operation with the group membership list 142 of the server process. If there are no members of this set intersection, no further action is
25 taken and the payload item in the message is not placed in any of the message queues 143. If there are members of the set intersection operation, the payload

43

item in the message is placed in the queues corresponding to the hosts that are members of the set intersection.

Multiple auxiliary addresses with logical operations

5 In its most sophisticated form, a send message can perform set operations between the implicit message group of the ULP server process and multiple logical and unicast ULP addresses. This is done by placing multiple auxiliary destination ULP addresses in the message with logical operators imbedded in the address list. The address count 126 holds a count of the total auxiliary addresses in the address list 127 and 128. The auxiliary addresses are a mix of
10 logical ULP addresses and unicast host ULP addresses. Two logical ULP addresses in the ULP address space are assigned the role of specifying set operations to be performed between the logical message groups and unicast host addresses in the message list. They are specially assigned addresses for the functions set intersection, set union. A third logical address is used to
15 indicate set complement. The payload consists of a message count 116 of one, the ULP of the host sending the message in the source ULP address 117 and the data length 118 and data 119.

The host sends the send message onto the network with a TLP header addressing the datagram to the GMS that is the selected target of the message.
20 The GMS receives the message and the GMS control function 136 determines that it is a send message datagram and looks up the implicit ULP message in the implicit ULP address list 138 and all of the addresses in the address list either in the host ULP address map 137 or in the logical ULP address list 145 as appropriate. If any of addresses does not exist, an error message is returned
25 to the sending host with a ULP receive message datagram. If the addresses are valid, the GMS control function removes the TLP header from the datagram

44

and sends the ULP portion to the ULP server process corresponding to the destination implicit ULP address. Assume for discussion that this is the ULP server process 140. The ULP server process extracts the auxiliary ULP address list from the message and scans it from beginning to end. The scanning and processing of the set operators is done in post-fix fashion. This means that arguments are read followed by an operator that is then applied to the arguments. The result of the operator becomes the first argument of the next operation. Therefore at the start of scanning two addresses are read from the address list. The next address will be an operator that is applied to the arguments and the result of this operator is the first argument to be used by the next operator. From then on a single address is read from the address list followed by a logical ULP address which is operator on the two arguments consisting of the new argument and the results of the last operator. The logical address used to indicate set complement is not a set operator, by an argument qualifier since it can precede any address in the address list. The meaning of the set complement argument qualifier is relative to the group membership of implicit group address in the send message. If the set complement qualifier precedes a unicast host address which is not a member of the message group selected by the implicit ULP address in the send message, the effective argument is the set of all hosts that are members of the implicit message group. If the set complement qualifier precedes a unicast host address which is a member of the message group selected by the implicit ULP address in the send message, the effective argument is the set of all hosts that are members of the implicit message group except for the original unicast host address qualified by the complement function. If the set complement qualifier precedes a logical ULP address the effective argument is the set of all hosts that are members of

45

the implicit message group specified by the send message except hosts that are members of the logical message group preceded by the set complement modifier. Once the entire address list has been processed to a single result set of hosts, a set intersection operation is performed on this set and the set of
5 members of the implicit message group 142 defined by the implicit address in the send message. If there are no members of this set intersection, no further action is taken and the payload item in the message is not placed in any of the message queues 143. If there are members of the set intersection operation,
10 the payload item in the message is placed in the queues corresponding to the hosts that are members of the set intersection.

Message Delivery and Aggregation

Once messages are entered into the message queues in the ULP server processes, there are a variety of ways that they can ultimately be delivered to the targeted hosts. In the invention, the delivery method is set on a per-ULP
15 server process basis by attributes that are provided at the time that an implicit ULP message group and server process are created. It is important during the description of these methods to keep in mind that the invention is intended to provide an efficient means for a group of hosts to send messages to each other at a rapid rate during the implementation of a networked interactive
20 application. Also assumed in the following description is that the GMS performs echo suppression when a host sends a message to a group that it belongs to. This means that the host will not receive a copy of its own message to the group either as a single un-aggregated message or as a payload item in an aggregated message. This is controlled by a ULP server process attribute
25 that can be changed to stop echo suppression, but echo suppression is the default.

46

Immediate Delivery

The most simple delivery method is to immediately deliver the payload items to their targeted hosts as soon as they are placed in the message queues. Each payload item in a message queue will contain a ULP source address, a data length and the data to be sent. To implement immediate delivery, the ULP server process will remove a payload item from a message queue for a particular host 143. The host address for this host will be obtained from the group membership list 142. The payload item and the destination host address will be sent to the GMS control function 136 where it will be used to create a ULP receive message sent to the destination host. The GMS control function 136 will use the destination ULP host address to look up the TLP address of the host from the host address map 137. This will be used to create a TLP header for the message 123. The ULP message type 124 will be ULP receive, the destination ULP address 125 will be the destination host, the address count will be 0 and there will be no auxiliary addresses. The payload in this case will have a message count 116 of 1 and the payload item comprised of fields 117, 118, and 119 will be the payload element taken from the message queue.

Immediate delivery is useful when the message rate between a group of hosts is low. Consider four hosts that are members of an implicit message group where each member of the group sends a message to every other member of the group at a fixed rate. With immediate delivery, each host will send three messages to the other members of the group and receive three messages from the other members of the group at the fixed rate. This is acceptable is the size of the group is small and the message rate is low. However, it is obvious that total message rate is the product of the underlying message rate and the total number of members of the group minus one. Clearly

47

this will result in unacceptably high message rates for large groups and highly interactive message rates. A group of 20 members that had an underlying message rate of 10 messages per second would yield a total message rate at each host of 190 messages sent and 190 messages received every second. This message rate will be unsupportable over a conventional dial-up connection to a conventional wide area network such as the internet.

Aggregation

A key concept in the present invention is the aggregation of multiple messages in a message queue into a single ULP receive message to a host that contains multiple payload items in the payload. The ULP server process removes payload items from a message queue for a host and accumulates them in an aggregation buffer 149. The aggregation buffer has buffer areas for each host for which there is a message queue. These individual host areas within the aggregation buffer are called host aggregation buffers. The start and end of this aggregation period can be controlled in a number of ways that will be described in the next sections. At the end of the aggregation period, the each host aggregation buffer may hold multiple payload items. The host aggregation buffer will hold a message count of the payload items followed by the multiple payload items. The contents of a host aggregation buffer along with the ULP host address of the corresponding host are sent to the GMS control function 136 where it will be used to create a ULP receive message sent to the destination host. The GMS control function 136 will use the destination ULP host address to look up the TLP address of the host from the host address map 137. This will be used to create a TLP header for the message 123. The ULP message type 124 will be ULP receive, the destination ULP address 125 will be the destination host, the address count will be 0 and

48

there will be no auxiliary addresses. The payload in this case will have a message count 116 set by the message count value from the host aggregation buffer. The payload will contain all of the payload items from the host aggregation buffer.

5 The effect of aggregation will be to greatly reduce the total message rate received by the hosts. A single message to a host will be able to carry multiple payload items received from the other hosts during the aggregation period. This fits very well the interactive applications of this invention where groups of hosts will be sending messages to all the other hosts in the group at a periodic
10 rate. Aggregation will be very effective in collecting together all of the messages from all of the other hosts into a single message for each member of the group. The reduces processing at each receiving host since a single message will be received rather than many separate messages. Aggregation will also reduce the total data rate to the hosts since aggregation eliminates the
15 need for separate message headers for each payload item. The savings will be significant for small payload items since there will be only one message header comprising fields 123, 124 and 125 for multiple payload items. In cases where a group of hosts are sending messages to the group at a periodic rate, it is often the case in many interactive applications that the data being sent by each host
20 to the group is very similar to the messages sent by the other hosts. This affords the opportunity within an aggregated payload of multiple payload items to apply a data compression method across the multiple data elements of the payload elements. A wide variety of known data compression methods will lend themselves to this application. The first data element in the first payload
25 item can be sent in uncompressed form with each subsequent data element being compressed using some form of difference coding method. A variety of

49

known data compression methods use the concept of a predictor with differences from the predicted value being encoded. The first data element in an aggregated payload can be used as this predictor with the subsequent data elements coded using such a data compression method. These conventional
5 data compression methods do not assume any knowledge of the internal structure or function of portions of a data element to compress. It is also possible to make use of application specific coding techniques that take advantage of such knowledge to potentially achieve much higher coding efficiency.

10 Server Isochronous

One method by which the aggregation time period can be defined is called Server Isochronous or SI. In this method, A ULP Server Process defines a uniform time base for defining the aggregation time period. This time base is defined by three parameters: the time period, the aggregation offset and the
15 transmit offset. These parameters are set by the attributes provided in the create implicit group control function at the time the implicit group and the ULP server process are created. The time period is a fixed time interval during which the ULP server process will accumulate messages in the message queues, aggregate the messages in the queues and send the aggregated
20 messages to the targeted hosts. The aggregation offset defines the point after the start of the time period after which arriving messages will be stored in the message queues for delivery in the next time period. Therefore, at the aggregation offset after the start of the time period, a snapshot will be taken of all of the messages in each message queue. New messages will continue to
25 arrive and be entered into the queues after the aggregation offset. Only those messages in the queues before the aggregation offset point will be aggregated

50

into outbound messages. The resulting aggregated messages will then be sent to their targeted hosts at the point in time which is the transmit offset after the start of the time period. The result is that messages arrive continuously and are stored in the message queues. Once per time period they are aggregated into
5 single messages to each host which is the target of messages and once per time period these aggregated messages are sent to the hosts.

Another embodiment of the SI method is to allow the ULP server process to dynamically vary the time period based on some criteria such as the received message rates, and/or received data rate. The ULP server could use a function
10 to define the aggregation period based on the number of messages received per second or the total number of payload bytes received per second. One reasonable function would be to shorten the aggregation period as the rate or received messages or data rate of the received payloads increased. This would
15 tend to keep the size of the outbound messages from growing too much as received messages and/or received data rate grew. Other possible functions could be used that varied the aggregation period based on received message rates, received payload data rates or other parameters available to the ULP server process.

Host Synchronous

20 The host synchronous or HS method of defining the aggregation time period allows the definition of a flexible time period that is controlled by the hosts. It is based on the concept of a turn which is a host sending a message to one or more members of the implicit message group which is operating in HS mode. Once every host in the message group has taken a turn, the aggregation
25 period ends. A snapshot of the contents of the message queues is taken, the contents of each of the queues is aggregated and the aggregated messages are

51

sent to the hosts targeted by each message queue. A refinement to this technique qualifies which of the three ULP send message types to the group constitute a host turn: a send only to the implicit address of the group, a send to a unicast host address within the group or a send to a logical ULP address which shares members with the group. The attributes of the group not only will define HS aggregation, but one or more ULP send message types that will be considered a host turn. A further refinement sets the total number of turns that a host can take in a single aggregation time period. The default will be one turn, but multiple turns can be allowed. If a host attempts to take more turns than allowed, the messages are ignored.

This aggregation technique has the additional benefit of causing the hosts which are member of an HS implicit message group to have their processing functions synchronized when they are executing the same interactive application. Many networked interactive applications are based on a simple overall three step operational model: wait for messages from other hosts, process the messages and the local users inputs to update the local application, send messages to the other hosts. This basic application loop is repeated at a rate fast enough to provide an interactive experience such as 5 to 30 times per second. It is desirable to keep such applications synchronized so that the states of the applications is consistent on the different host machines. When such applications communicate using the HS model of the present invention their operations will become naturally synchronized. The HS ULP server process will wait until all of the members of the message group has completed their turns and sent a message to the group before sending the aggregated messages to the members of the group. This will cause the applications on the hosts to wait until they have received the aggregated messages. They will all then start

52

processing these messages along with the local user inputs. Even if they perform their processing at different speeds and send their next messages to the group at different times, the HS ULP server will wait until all have completed their processing and reported in with a message to the group. This will keep all
5 of the host applications synchronized in that every host will be at the same application loop iteration as all of the others. This will keep the application state consistent on all of the hosts. Only network propagation delays from the GMS to the hosts and different processing speeds of the hosts will cause the start and completion of their processing to begin at different times. It is not a
10 requirement in networked applications to keep all of the hosts precisely synchronized, only that that application state is consistent. The HS method provides a natural way to do this in the context of the present invention.

Preferred Embodiment

The detailed description of the invention has described a datagram
15 implementation of the invention as the best way to explain the invention. The preferred embodiment of the invention is as follows.

In the preferred embodiment, the wide area network is the Internet and the TLP protocol is TCP/IP. The GMS is a general purpose computer system connected to the Internet and the hosts are personal computers connected to
20 the Internet.

TCP/IP provides an number of advantages that provide for a more efficient applications interface on the hosts 151. TCP/IP supports the concept of source and destination port numbers in its header. The ULP can make use of the port numbers to identify source and destination ULP connections. Most ULP send
25 messages will be from hosts to a implicit ULP group addresses and most ULP receive messages will be from the implicit ULP addresses to the ULP host

53

addresses. All of these and the ULP message type field can be represented by source and destination port addresses within the TCP/IP header. This means that for most ULP messages, the ULP message encapsulated within the TCP/IP message need only contain the payload. There is the slight complication of the aggregated ULP receive messages sent from a ULP server process to a host. Here the destination port will be the host the source port will be for the implicit ULP group address and the payload will still contain the source host ULP addresses in each the payload items.

TCP/IP also supports header compression for low speed dial-up lines which is also important in this application. See RFC 1144. TCP/IP is a connection oriented protocol which provides reliable end-to-end transport. It handles retransmission on errors and fragmentation and reassembly of data transparently to upper level protocols. Header compression allows much of the TCP/IP header to be omitted with each packet to be replaced by a small connection identifier. This connection ID will uniquely define a connection consisting of a source and destination IP address and source and destination TCP/IP port numbers.

At the interface to the application on the hosts, the preferred embodiment of the ULP is as a session layer protocol. In the preferred embodiment the application on a host opens a session with a ULP server process. This session is identified with a unique session ID on the host. The host application then sends data to the ULP host interface 151 tagged with this session ID. The session ID defines a host and implicit ULP pair including the TCP/IP TLP address of the GMS server that is running the particular ULP server process for the implicit ULP address. By binding the transport address of the GMS of a ULP server process to the session ID, we can transparently to the application

54

support multiple group messaging servers on the network and a single host can have multiple active sessions with different physical group messaging servers. This avoids any address space collision problems that could arise from the fact that the ULP address space is unique to each GMS.

5 **Alternate Embodiments**

One possible extension to the invention is to extend the ULP to support a common synchronized time base on the GMS and the hosts that are connected to it. This would be most interesting in context of the SI message aggregation mode. The SI time base on the GMS could be replicated on all of the hosts and
10 all of the hosts and the GMS could lock these time bases together. There are known methods to synchronize time bases on multiple computer systems. One such method is called NTP.

Another extension to the invention is to define ULP server processes that perform specific application specific processing on the contents of the messages
15 that are received. A variety of different application specific processing functions can be defined and implemented. A particular function would be selected by attributes provided in the create implicit group function. These functions could process the data in the message payloads and replace the data elements in the payloads with processed results. Separately, or in combination
20 with processing the message payloads, the processing could store either raw message payload data in the application specific state storage area or could store processed results.

Clearly, the host system need not be personal computers, but could also be
25 dedicated game consoles or television set top boxes or any other device with a programmable controller capable of implementing the ULP protocol.

55

The wide area network used to transport the ULP protocol need not be the Internet or based on IP. Other networks with some means for wide area packet or datagram transport are possible including ATM networks or a digital cable television network.

- 5 The invention now being fully described, it will be apparent to one of ordinary skill in the art that any changes and modifications can be made thereto without departing from the spirit or scope of the invention as set forth herein. Accordingly, the present invention is to be limited solely by the scope of the appended claims.

56

WHAT IS CLAIMED IS:

1. A method for providing group messages to a plurality of host computers connected over a unicast wide area communication network, comprising the steps of:

5 providing a group messaging server coupled to said network, said server communicating with said plurality of host computers using said unicast network and maintaining a list of message groups, each message group containing at least one host computer;

10 sending, by a first host computer belonging to a first message group, a message to said server via said unicast network, said message containing a payload portion and a portion for identifying said first message group; and transmitting, by said server via said unicast network, said payload portion to selected host computers belonging to said first group.

15 2. The method of claim 1 wherein said selected host computers comprising all host computers belong to said first group except said first host computer.

20 3. The method of claim 1 wherein said message also contains a portion for identifying a second message group, said selected host computers being selected from a set operation of members in said first and said second message groups.

4. The method of claim 1 further comprising the step of creating, by a second host computer, said first message group by sending a first control message to said server via said unicast network.

57

5. The method of claim 4 further comprising the step of joining, by said first host computer, said first message group by sending via said unicast network a second control message to said server specifying said first message group.

5 6. The method of claim 1 wherein said network is Internet and said server communicates with said plurality of host computers using a session layer ~~protocol~~.

1 A method for providing group messages to a plurality of host computers connected over a unicast wide area communication network, comprising the steps of:

10 providing a group messaging server coupled to said network, said server communicating with said plurality of host computers using said unicast network and maintaining a list of message groups, each message group containing at least one host computer;

15 sending, by a plurality of host computers belonging to a first message group, messages to said server via said unicast network, said messages containing a payload portion and a portion for identifying said first message group;

20 aggregating, by said server in a time interval determined in accordance with a predefined criterion, said payload portions of said messages to create an aggregated payload;

forming an aggregated message using said aggregated payload; and transmitting, by said server via said unicast network, said aggregated message to a recipient host computer belonging to said first message group.

25 28. The method of claim 1 wherein said time interval is a fixed period of time.

58

3
9. The method of claim 7 wherein said time interval corresponds to a time for said server to receive at least one message from each host computer belonging to said first message group.

4
10. The method of claim 7 further comprising the step of creating, by one of said plurality of host computers, said first message group by sending a first control message to said server via said unicast network.

5
11. The method of claim 10 further comprising the step of joining, by some of said plurality of host computers, said first message group by sending control messages via said unicast network to said server specifying said first message group.

6
12. The method of claim 7 wherein said network is Internet and said server communicates with said plurality of host computers using a session layer protocol.

13. A method for providing group messages to a plurality of host computers connected over a unicast wide area communication network, comprising the steps of:

providing a group messaging server coupled to said network, said server communicating with said plurality of host computers using said unicast network and maintaining a list of message groups, each message group containing at least one host computer;

dynamically joining, by a first host computer, message groups on said list by sending a first control message to said server via said unicast network, said first control message specifying a message group desired to be joined by said first host computer; and

dynamically leaving, by said first host computer, message groups on said list by sending a second control message to said server via said unicast

59

network, said second control message specifying a message group said first host computer desires to leave.

14. The method of claim 13 wherein said first host computer belongs to a first message group, said method further comprising the steps of:

5 sending, by said first host computer, a message to said server via said unicast network, said message containing a payload portion and a portion for identifying said first message group; and

transmitting, by said server via said unicast network, said payload portion to selected host computers belonging to said first group.

10 15. The method of claim 14 wherein said selected host computers comprising all host computers belong to said first group except said first host computer.

16. The method of claim 14 wherein said message also contains a portion for identifying a second message group, said selected host computers
15 being selected from a set operation of members in said first and said second
~~message groups.~~

08/595323

ABSTRACT

A method for deploying interactive applications over a network containing host computers and group messaging servers is disclosed. The method operates in a conventional unicast network architecture comprised of conventional network links and unicast gateways and routers. The hosts send messages containing destination group addresses by unicast to the group messaging servers. The group addresses select message groups maintained by the group messaging servers. For each message group, the group messaging servers also maintain a list of all of the hosts that are members of the particular group. In its most simple implementation, the method consists of the group server receiving a message from a host containing a destination group address. Using the group address, the group messaging server then selects a message group which lists all of the host members of the group which are the targets of messages to the group. The group messaging server then forwards the message to each of the target hosts. In an interactive application, many messages will be arriving at the group server close to one another in time. Rather than simply forward each message to its targeted hosts, the group messaging server aggregates the contents of each of messages received during a specified time period and then sends an aggregated message to the targeted hosts. The time period can be defined in a number of ways. This method reduces the message traffic between hosts in a networked interactive application and contributes to reducing the latency in the communications between the hosts.

**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR UTILITY PATENT APPLICATION**

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS

the specification of which

 X is attached hereto.

_____ was filed on _____ as Application Serial No. _____
and was amended on _____
(If Applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a) which states in relevant part: "Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section....The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98."

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate as indicated below and have also identified below any foreign application for patent or inventor's certificate on this invention having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
_____	_____	_____	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)		
_____	_____	_____	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)		

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulation, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>(Application Serial No.)</u>	<u>(Filing Date)</u>	<u>(Patented, Pending, Abandoned)</u>
---------------------------------	----------------------	---------------------------------------

<u>(Application Serial No.)</u>	<u>(Filing Date)</u>	<u>(Patented, Pending, Abandoned)</u>
---------------------------------	----------------------	---------------------------------------

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, and to file, prosecute and to transact all business in connection with international applications directed to said invention:

Stephen C. Durant	<u>31,506</u>
Michael Hetherington	<u>32,357</u>
Hark C. Chan	<u>35,477</u>
Charles D. Holland	<u>35,196</u>
Michael J. Murphy	<u>37,404</u>
Michael J. Panepucci	<u>37,203</u>

6

Address all correspondence to:

H. C. Chan
Wilson, Sonsini, Goodrich & Rosati
650 Page Mill Road
Palo Alto, CA 94304

Direct all telephone calls to H.C. Chan at (415) 493-9300.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



Patent
Attorney Docket No. 16326.701

Applicant or Patentee: Daniel Joseph Samuel et al.

Serial or Patent No.: Unknown

Filed or Issued: Herewith

For: Server-Group Messaging System For Interactive Applications

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.90(f) and 1.27(c) - SMALL BUSINESS CONCERN**

I hereby declare that I am

- the owner of the small business concern identified below:
- an official of the small business concern empowered to act on behalf of the concern identified below:

Name of Concern: Mpath Interactive, Inc.

Address of Concern: 10455-A Bandley Drive, Cupertino, CA 95014

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third-party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed, to and remain with the small business concern identified above with regard to the invention, entitled

SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS

by inventor(s) Daniel Joseph Samuel, Marc Peter Kwiatkowski and Jeffrey Jackiel Rothschild, described in

- the specification filed herewith
- Application Serial No. _____, filed _____
- Patent No. _____, issued _____

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Name: _____

Address: _____

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earlier of the issue fee or any maintenance fee due after the date on which status as a small business entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which the verified statement is directed.

Name of Person Signing: Brian A. Apgar

Title of Person Other Than Owner: Executive Vice President of Development

Address of Person Signing: 10455-A Bandley Drive, Cupertino, CA 95014

Signature: Brian A. Apgar Date: 1/30/96

***NOTE:** Separate verified statements are required from each named person, concerned or organization having having rights to the invention averring to their status as small entities. (37 CFR 1.27).

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 1995

Application or Docket Number

08/595323

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE		
TOTAL CLAIMS	16	minus 20 = * 0
INDEPENDENT CLAIMS	3	minus 3 = * 0
MULTIPLE DEPENDENT CLAIM PRESENT		

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
	375.00	OR		750.00
x\$11=	-	OR	x\$22=	
x39=	-	OR	x78=	
+125=		OR	+250=	
TOTAL		OR	TOTAL	
375.00				

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

	(Column 1)		(Column 2)		(Column 3)		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total	*	6	Minus	**	20	=
	Independent	*	1	Minus	***	3	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM						

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
x\$11=		OR	x\$22=	
x39=	40	OR	x78=	
+125=	135.00	OR	+250=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	
0				

	(Column 1)		(Column 2)		(Column 3)	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total	*		Minus	**	=
	Independent	*		Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM					

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
x\$11=		OR	x\$22=	
x39=		OR	x78=	
+125=		OR	+250=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)		(Column 2)		(Column 3)	
AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total	*		Minus	**	=
	Independent	*		Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM					

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
x\$11=		OR	x\$22=	
x39=		OR	x78=	
+125=		OR	+250=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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.

Best Available Copy

PATENT APPLICATION SERIAL NO. 08/595323

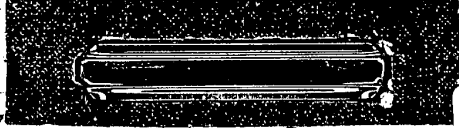
U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

260 YC 23-2415 02/21/96 0859323
26008 201 375.00CH 16.00/01

PTO-1556
(5/87)

200-17
5822523

Class
Subclass
ISSUE CLASSIFICATION



5822523



UTILITY SERIAL NUMBER	PATENT DATE	PATENT NUMBER
08/595,323	OCT 13 1998	5822523

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMINER
08/595,323	9/29/98	395		2734	

APPLICANTS
 JEFFREY J. ROTHSCHILD, LOS GATOS, CA;
 DANIEL J. SAMUEL, SUNNYVALE, CA;
 JEFFREY J. ROTHSCHILD, LOS GATOS, CA;
 DANIEL J. SAMUEL, SUNNYVALE, CA.

CONTINUING DATA***
 VERIFIED

FOREIGN APPLICATIONS***
 VERIFIED

FOREIGN FILING LICENSE GRANTED 03/20/96 ***** SMALL ENTITY *****

Foreign priority claimed 35 USC 119 conditions met	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDER CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
Verified and Acknowledged	Examined's initials	AS FILED	CA	11	16	3	\$375.00	16326,701

ADDRESS
 H. CHAN
 107 SOUTH DEANZA BLVD
 SUITE 202
 SAN JOSE CA 95129
 Sterne Kesler Goldstein & Fox P.C.
 1100 New York Ave NW
 Suite 600
 Washington DC 20005-3934

ISSUE FILE FILE

TITLE
 SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS

U.S. DEPT. OF COMM./PAT. & TM - PTO-436L (Rev. 12-84)

PARTS OF APPLICATION FILED SEPARATELY		7/97		Richard S. Miller Applications Examiner	
NOTICE OF ALLOWANCE MAILED		ZARNI MAUNG		CLAIMS ALLOWED	
7-9-97		Assistant Examiner		Total Claims	Print Claim
				6	1
ISSUE FEE AD		WILLIAM M. TREAT PRIMARY EXAMINER GROUP 2300		DRAWING	
Amount Due	Date Paid	Primary Examiner		Sheets Drwg.	Figs. Drwg.
645.00	9/22/97	PREPARED FOR ISSUE		11	11
Label Area				Print Fig.	7
				ISSUE BATCH NUMBER	P18/

WARNING: The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368. Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.

Form PTO-436A (Rev. 8/92)

(FACE)

SEARCHED			
Class	Sub.	Date	Exmr.
395	200-1	3/14/97	ER
395	200-01	↓	↓
395	200-09		
395	200-17		
395	200-05		
370	85-13	↓	↓
370	60		
375	793		

SEARCH NOTES		
	Date	Exmr.
AFS secretary the results attached	3/14/97	ER
Consulted with Primary Examiner Robert B. Hamell	3/14/97	ER
Consulted with Primary Ex. Ellis Primary Ex. Treat	3/14/97	ER

INTERFERENCE SEARCHED			
Class	Sub.	Date	Exmr.
395	200-17	3/12/97	ER
395	200-1	↓	↓
395	200-09		

(RIGHT OUTSIDE)

Best Available Copy
Staple Issue Slip Here

POSITION	ID NO.	DATE
CLASSIFIER	20	2/23
EXAMINER	Arleve Thomas	
TYPIST	A. H.	3/59
VERIFIER		
CORPS CORR.		
SPEC. HAND		
FILE MAINT.		
DRAFTING		

INDEX OF CLAIMS

Claim	Date	
	Final	Original
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		

Claim	Date	
	Final	Original
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

SYMBOLS
 ✓ Rejected
 - Allowed
 (Through numerals) Cancelled
 N Restricted
 N Non-elected
 I Interference
 A Appeal
 O Objected

(LEFT INSIDE)

200-17
3957-95323
Class
Specials

UTILITY SERIAL NUMBER
SERIAL NUMBER 08/595,323

APPLICANTS
JEFFREY J.
JEFFREY J.
DANIEL J.

*CONTINUED VERIFIED

*CONTINUED VERIFIED

1 FEB JUN 1-1

Foreign priority claimer 35 USC 119 conditions

Verified and Acknowledged

FR CHAN
1007 COLLEGE
SUITE 202
SAN JOSE

ADDRESS

GENVEN-GR

TITLE

PARTS OF APPLI FILED SEPARATI

NOTICE OF ALLI

7-9-

ISSUI

Amount Due
645.00

La
Ar

Form PTO-436A (Rev. 8/92)

11111 U.S. PTO



11/19/96

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on: November 15, 1996.

Donna L. Hengst
Donna L. Hengst

*11-19-96
Hengst*

PATENT
Attorney Docket No. 16326-701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:)
Daniel J. Samuel, et al.)
Serial No. 08/595,323)
Filed: February 1, 1996)
For: SERVER-GROUP MESSAGING SYSTEM)
FOR INTERACTIVE APPLICATIONS)

Examiner: Unknown

Group Art Unit: 2398

RECEIVED
DEC 4 1996
GROUP 2300

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT WITHIN THREE MONTHS OF FILING OR BEFORE MAILING OF FIRST OFFICE ACTION

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Time of Transmittal of Accompanying Information Disclosure Statement

The Information Disclosure Statement submitted herewith is being filed within three months of the filing date of this application or the date of entry of the national stage of an international application or before the mailing date of a first Office Action on the merits, whichever event occurs last (37 CFR 1.97(b)).

The Commissioner is authorized to charge any additional fees which may be required, including petition fees, or credit any overpayment to Deposit Account No. 23-2415 (16326-701). A duplicate copy of this page is enclosed:

Respectfully submitted,

WILSON, SONSINI, GOODRICH & ROSATI

By: *H.C. Chan*
H.C. Chan
Registration No. 35,477

650 Page Mill Road
Palo Alto, CA 94304-1050
(415) 493-9300

Date: November 15, 1996

H:\HOME\DH1\CLIENTS\MPATH\T-IDS.701

11/19/96

CERTIFICATE OF MAILING. I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on: November 15, 1996

Donna L. Hengst
Donna L. Hengst

PATENT
Attorney Docket No. 16326-701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Daniel J. Samuel, et al.	)	Examiner: Unknown
)	
Serial No. 08/595,323	)	Group Art Unit: 2306
)	
Filed: February 1, 1996)	
)	
For: SERVER-GROUP MESSAGE SYSTEM)	
FOR INTERACTIVE APPLICATIONS)	

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Preliminary Statement

Applicant submits herewith patents, publications or other information of which it is aware, which it believes may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR 1.56.

The filing of this information disclosure statement shall not be construed as a representation that a search has been made, an admission that the information cited is, or is considered to be, material to patentability or that no other material information exists.

H:\HOME\DH1\CLIENTS\MPATH\IDS.701

The filing of this information disclosure statement shall not be construed as an admission against interest in any manner.

The following are submitted herewith:

- PTO-1449 listing the patents and publications listed above
- Fee under 37 CFR § 117(p) for submission of Information Disclosure Statement under § 1.97(c)
- Certification under 37 CFR § 1.97(e)
- Petition under 37 USC § 1.97(d)(ii)
- Fee under 37 CFR § 117(i)(I) for submission of Information Disclosure Statement under § 1.97(d)

The Commissioner is authorized to charge any additional fees which may be required, including petition fees, or credit any overpayment to Deposit Account No. 23-2415 (16326-701). A duplicate copy of this paper is enclosed.

Respectfully submitted,

WILSON, SONSINI, GOODRICH & ROSATI

By



H.C. Chan

Registration No. 35,477

650 Page Mill Road
Palo Alto, CA 94304-1050
(415) 493-9300

Date: November 15, 1996

United States Patent [19] Patent Number: 5,586,267
Chatwani et al. [45] Date of Patent: Dec. 17, 1996

- [54] APPARATUS FOR PROVIDING FOR AUTOMATIC TOPOLOGY DISCOVERY IN AN ATM NETWORK OR THE LIKE
[75] Inventors: Dilip Chatwani; Rajan Subramanian, both of Newark; Winnis Chiang, Los Altos Hills; Jonathan Davar, San Jose; Ayal Opher, Mountain View; Shiva Sawant, Santa Clara, all of Calif.
[73] Assignee: Bay Networks, Inc., Santa Clara, Calif.
[21] Appl. No.: 484,656
[22] Filed: Jun. 7, 1995

Related U.S. Application Data

[60] Division of Ser. No. 86,431, Jun. 29, 1993, abandoned, which is a continuation-in-part of Ser. No. 959,732, Oct. 13, 1992, Pat. No. 5,519,707.

- [51] Int. Cl. G06F 11/30
[52] U.S. Cl. 395/200.11
[58] Field of Search 364/DIG. 1 MS File, 364/DIG. 2 MS File; 395/200.01, 200.06, 200.1, 200.11; 370/17, 53, 54

References Cited

U.S. PATENT DOCUMENTS

4,545,013 10/1985 Lyon et al. 364/200
4,644,532 2/1987 George et al. 370/94.1
4,827,411 5/1989 Arrowood et al. 364/200
4,847,830 7/1989 Momiurov 370/58.1
4,984,264 1/1991 Katsube 379/197
5,012,466 4/1991 Bahrke et al. 370/62
5,031,093 7/1991 Hasegawa 370/17
5,038,343 8/1991 Lebizay et al. 370/60
5,049,873 9/1991 Robins et al. 340/825.06
5,062,103 10/1991 Davidson et al. 370/58.1
5,079,767 1/1992 Perlman 370/200
5,101,348 3/1992 Arrowood et al. 395/200
5,140,585 8/1992 Tomikawa 370/60.1
5,150,464 9/1992 Sidhu et al. 395/200
5,164,938 11/1992 Jurkevich et al. 370/60
5,165,091 11/1992 Lapc et al. 370/94.1
5,177,736 1/1993 Tanabe et al. 370/60

OTHER PUBLICATIONS

- Ross Finlayson, "Bootstrap Loading Using TFTP", Networking Group Request for Comments: 906. Jun. 1984. pp. 1-4.
J. Postel, "User Datagram Protocol", Request for Comments: 768. Aug. 28, 1980. pp. 1-3.
K. R. Sollins, "The TFTP Protocol (Revision 2)", Network Working Group Request for Comments: 783. Jun. 1981. pp. 1-9.

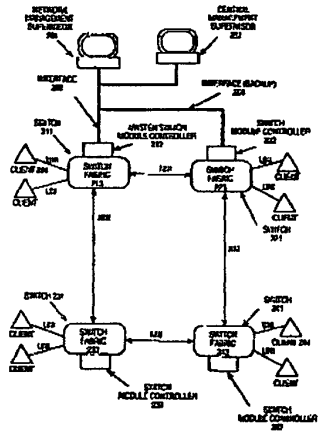
(List continued on next page.)

Primary Examiner—Robert B. Harrell
Attorney, Agent, or Firm—Blakely, Sokoloff, Taylor & Zafman

ABSTRACT

An asynchronous transfer mode (ATM) network or the like employing a method and apparatus for automatically determining the topology of the network is described. The method and apparatus provides for each switch in the network transmitting on each of its ports link advertisement messages (without processing intervention by intermediate switches). The link advertisement messages are received by neighbor switches and forwarded to a topology manager. The topology manager constructs network topology profile information based on received link advertisement messages. Further, the topology manager is able to verify bidirectional links based on the received link advertisement messages.

7 Claims, 53 Drawing Sheets



15 MAR 1997 12:44:13 U.S. Patent & Trademark Office P0001

```

*****
*
*      Welcome to MESSENGER S97.1 on V-PORT at APS4
*
*****
*
*      The files available on this port are:
*      HOME, USPAT, TRAIN, JPOABS, EPOABS, USOCR
*
*      GPI files for BETA testing: EPO and JPO
*
*****

```

FILE 'USPAT' ENTERED AT 12:44:13 ON 15 MAR 1997

```

*****
*      WELCOME TO THE
*      U. S. PATENT TEXT FILE
*      ON V-PORT AT APS4
*
*****

```

```

=> s message# (2a) server# or news (2a) server#
    43705 MESSAGE#
    4490 SERVER#
    348 MESSAGE# (2A) SERVER#
    5116 NEWS
    4490 SERVER#
    7 NEWS (2A) SERVER#
L1    351 MESSAGE# (2A) SERVER# OR NEWS (2A) SERVER#

```

```

=> s wide area network# or wan or internet#
    462381 WIDE
    779580 AREA
    128978 NETWORK#
    788 WIDE AREA NETWORK#
      (WIDE(W)AREA(W)NETWORK#)
    703 WAN
    491 INTERNET#
L2    1455 WIDE AREA NETWORK# OR WAN OR INTERNET#

```

```

=> s world wide web or l2
    33486 WORLD
    462381 WIDE
    97426 WEB
    6 WORLD WIDE WEB
      (WORLD(W)WIDE(W)WEB)
L3    1457 WORLD WIDE WEB OR L2

```

```

=> s l3 and l1
L4    88 L3 AND L1

```

=>

INPUT:

Move | Text Search | Close

```

15 MAR 1997 13:05:22      U.S. Patent & Trademark Office      P0006
L4      88 S L3 AND L1
L5      18 S (SEND? OR TRANSMIT?) (P) (COMBINE## PACKET# OR COMPRESS## P
L6      0 S L5 AND L1
L7      2 S ROUT? (P) COMBIN? PACKET#

```

=> d his

(FILE 'USPAT' ENTERED AT 12:44:13 ON 15 MAR 1997)

```

SET PAGELength 62
SET LINELENGTH 78

```

```

L1      351 S MESSAGE# (2A) SERVER# OR NEWS (2A) SERVER#
L2      1455 S WIDE AREA NETWORK# OR WAN OR INTERNET#
L3      1457 S WORLD WIDE WEB OR L2
L4      88 S L3 AND L1
L5      18 S (SEND? OR TRANSMIT?) (P) (COMBINE## PACKET# OR COMPRESS## P
L6      0 S L5 AND L1
L7      2 S ROUT? (P) COMBIN? PACKET#

```

=>

INPUT:



**UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO. 08/595,323	FILING DATE 02/01/96	FIRST NAMED INVENTOR SAMUEL	ATTORNEY DOCKET NO. D 16326.701
-------------------------------	-------------------------	--------------------------------	------------------------------------

HC CHAN
WILSON SONSINI GOODRICH & ROSATI
650 PAGE MILL RD
PALO ALTO CA 94304

B3M1/0320

EXAMINER
MAUNG,Z

ART UNIT 2315	PAPER NUMBER
------------------	--------------

DATE MAILED: 03/20/97


4

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

Commissioner of Patents and Trademarks

Office Action Summary

Application No. 08/595,323	Applicant(s) Samuel et al.
Examiner Zarni Maung	Group Art Unit 2315



Responsive to communication(s) filed on Feb 1, 1996

This action is **FINAL**.

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.

A shortened statutory period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

Claim(s) 1-16 is/are pending in the application.

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

Claim(s) _____ is/are allowed.

Claim(s) 1-16 is/are rejected.

Claim(s) _____ is/are objected to.

Claims _____ are subject to restriction or election requirement.

Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The drawing(s) filed on _____ is/are objected to by the Examiner.

The proposed drawing correction, filed on _____ is approved disapproved.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

All Some* None of the CERTIFIED copies of the priority documents have been received.

received in Application No. (Series Code/Serial Number) _____.

received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

Notice of References Cited, PTO-892

Information Disclosure Statement(s), PTO-1449, Paper No(s). 3

Interview Summary, PTO-413

Notice of Draftsperson's Patent Drawing Review, PTO-948

Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Serial Number: 08/595,323

Page 2

Art Unit: 2315

15. Claims 1-16 are presented for examination.

16. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

17. Claims 1-16 are rejected under 35 U.S.C. § 103 as obvious over Page' et al., U.S. Patent Number 5329619 (hereinafter Page'), in view of Perlman et al., U.S. Patent Number 5309437 (hereinafter Perlman).

Page' discloses a method for providing group messages to a plurality of host computers connected over a wide area communication network (see figures 2 and 23,

Serial Number: 08/595,323

Page 3

Art Unit: 2315

clients connected to servers via communications network 22), wherein said method comprising the steps of:

providing a group broker server (broker 14 and request queue or message queue) coupled to said network, said server communicating with said plurality of host computers using said network and maintaining a list of message groups, each message group containing at least one host computer (see column 23, line 58 to column 24 line 50, column 45 Message queuing section);

sending, by a first host computer belonging to a first group, a request to said server via said network, said request containing a payload portion and a portion for identifying said first group (see section II, a particular client requesting services or sending messages to particular servers. The requests or messages with the HAPI contain the requester ID and payload portion),

transmitting, by said server via said network, said payload portion to selected host computers belonging to said first group (See sections II and III, the broker server requests the required messages from the host servers for the requesting clients, stores the messages in message queue and transmits the messages to requested clients).

Page' does not explicitly show the message server; However, the broker server 14 requests the required messages from the host servers for the requesting clients, stores the request messages in message queue or reliable media and transmits the messages to the requesting clients. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Page' to include a message server

Serial Number: 08/595,323

Page 4

Art Unit: 2315

in view of the broker server having message queue for maintaining messages from the clients to the servers. Page' does not explicitly show that the network is a unicast network; however, Perlman teaches that aspect of the invention (see column 5, lines 5-11, 50-63). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the unicast implementation in Page' in view of Perlman, since it is old and well known in the art to use unicast network in a distributed client/server disclosed by Page'.

18. As per claim 2, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set forth in claim 1 above, wherein Page' does not explicitly show that the selected host computers comprising all host computers belong to said first group except said first host computer. However, it would have been obvious for one of ordinary skill in the art to recognize that the broker server would not select the requesting station as one of the selected stations, and one skilled in the art can recognize that the hosts responsive to said request do not include the requester itself. In addition, Perlman further teaches that aspect of the invention (see column 5, lines 50-66, Perlman discloses that the message packets are forwarded to all other hosts except the one from the message was received). Therefore, it would have been obvious to one skill in the art to modify Page' in view of Perlman and forward the messages to the hosts other than the one from the message was received.

Serial Number: 08/595,323

Page 5

Art Unit: 2315

19. As per claim 3, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set forth in above claims, wherein said message also contains a portion for identifying a second message group, the selected host computers being selected from a set operation of members in said first and said second message groups (see section II, the broker selects the hosts using host ID and Conv ID).

20. As per claim 4, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set forth in above claims, wherein said method further comprising the step of creating, by a second host computer, said first message group by sending a first control message to said server via said network (see column 15, server program)

21. As per claim 5, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set forth in above claims, wherein said method further comprising the step of joining, by said first host computer, said first message group by sending via said network a second control message to said server specifying said first message group (see columns 15-16).

22. As per claim 6, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set

Serial Number: 08/595,323

Page 6

Art Unit: 2315

forth in above claims, wherein said network is Internet and said server communicates with said plurality of host computers using a session layer protocols (see column 3, lines 20-28, session layer is inherent).

23. As per claim 7, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network comprising the steps of :

providing a group messaging server coupled to said network, said server communicating with said plurality of host computers using said network and maintaining a list of message groups, each message group containing at least one host computer; sending, by a first host computer belonging to a first group, a request to said server via said network, said request containing a payload portion and a portion for identifying said first group (see section II, a particular client requesting services or sending messages to particular servers. The requests or messages with the HAPI contain the requester ID and payload portion),

aggregating, by said server in a time interval determined in accordance with a predefined criterion, said payload portions of said messages to create an aggregated payload (see cleanup manager, columns 25-26);

transmitting, by said server via said network, said payload portion to selected host computers belonging to said first group (see sections II and III, the broker server requests the required messages from the host servers for the requesting clients, stores the

messages in message queue and transmits the messages to requested clients).

Page' does not explicitly show the message server; However, the broker server 14 requests the required messages from the host servers for the requesting clients, stores the request messages in message queue or reliable media and transmits the messages to the requesting clients. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Page' to include a message server in view of the broker server having message queue for maintaining messages from the clients to the servers. Page' does not explicitly show that the network is a unicast network; however, Perlman teaches that aspect of the invention (see column 5, lines 5-11, 50-63). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the unicast implementation in Page' in view of Perlman, since it is old and well known in the art to use unicast network in a distributed client/server disclosed by Page'.

24. As per claims 8-9, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set forth in above claim, wherein said time interval is fixed and corresponds to a time for said server to receive at least one message from each host computer belonging to said first message group (see columns 31-32, Min-Max timeout).

25. As per claim 10, Page' discloses the method for providing group messages to a

Serial Number: 08/595,323

Page 8

Art Unit: 2315

plurality of host computers connected over a wide area communication network as set forth in above claims, wherein said method further comprising the step of creating, by a second host computer, said first message group by sending a first control message to said server via said network (see column 15, server program)

26. As per claim 11, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set forth in above claims, wherein said method further comprising the step of joining, by said first host computer, said first message group by sending via said network a second control message to said server specifying said first message group (see columns 15-16).

27. As per claim 12, Page' discloses the method for providing group messages to a plurality of host computers connected over a wide area communication network as set forth in above claims, wherein said network is Internet and said server communicates with said plurality of host computers using a session layer protocols (see column 3, lines 20-28, session layer is inherent).

28. As per claims 13-16, they do not teach or further define the prior rejected claims 1-12, and claims 13-16 are also rejected for the similar reasons set forth in above paragraphs, *supra*.

Serial Number: 08/595,323

Page 9

Art Unit: 2315

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(a) Method and system of multicast routing for groups with a single transmitter by Green, U.S. Patent Number 5517494.

(b) Inter-domain multicast routing by Doeringer et al., U.S. Patent Number 5361256.

(c) Local area network device startup process by Sidhu et al., U.S. Patent Number 5150464.

(d) Distributed configuration profile for computing system by Miller et al., U.S. Patent Number 5475819.

(e) Web browser with dynamic display of information objects during linking by Judson, U.S. Patent Number 5572643.

(f) Network bridge with multicast forwarding table by Virgile, U.S. Patent Number 5608726.

(g) Method and apparatus for providing a local area network bridge by Marshall, U.S. Patent Number 5027350.

30. A shortened statutory period for response to this action is set to expire **3 (three) months and 0 (zero) days** from the mail date of this letter. Failure to respond within the period for response will result in **ABANDONMENT** of the applicant (see 35 U.S.C 133, M.P.E.P 710.02, 710.02(b)).

Serial Number: 08/595,323


Art Unit: 2315

1 Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Zarni Maung whose telephone number is 703-308-6687. The Examiner can normally be reached on Monday through Friday from 7:30 to 4:00.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Lall, can be reached on 703-305-9715. The fax phone number for this Group is 703-308-5356.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is 703-305-9600.

March 15, 1997


PARSHOTAMS. LALL
PRIMARY EXAMINER
ART UNIT 234

Notice of References Cited

Application No.
08/595,323

Applicant(s)
Samuel et al.

Examiner
Zarni Maung

Group Art Unit
2315

Page 1 of 1

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	5,329,619	7/12/94	Page' et al.	395	200.01
B	5,309,437	5/3/94	Perlman et al.	370	85.13
C	5,517,494	5/14/96	Green	370	60
D	5,361,256	11/1/94	Doeringer et al.	370	60
E	5,150,464	9/22/92	Sidhu et al.	395	200.01
F	5,475,819	12/12/95	Miller et al.	395	200.01
G					
H					
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U		
V		
W		
X		

NOTICE OF DRAFTSPERSON'S PATENT DRAWING REVIEW

PTO Draftpersons review all originally filed drawings regardless of whether they are designated as formal or informal. Additionally, patent Examiners will review the drawings for compliance with the regulations. Direct telephone inquiries concerning this review to the Drawing Review Branch, 703-305-8404.

The drawings filed (insert date) 2/1/96, are

A. not objected to by the Draftsperson under 37 CFR 1.84 or 1.152.

B. objected to by the Draftsperson under 37 CFR 1.84 or 1.152 as indicated below. The Examiner will require submission of new, corrected drawings when necessary. Corrected drawings must be submitted according to the instructions on the back of this Notice.

- DRAWINGS.** 37 CFR 1.84(a): Acceptable categories of drawings:
 - Black ink. Color.
 - Not black solid lines. Fig(s) _____
 - Color drawings are not acceptable until petition is granted. Fig(s) _____
- PHOTOGRAPHS.** 37 CFR 1.84(b)
 - Photographs are not acceptable until petition is granted. Fig(s) _____
 - Photographs not properly mounted (must use bristol board or photographic double-weight paper). Fig(s) _____
 - Poor quality (half-tone). Fig(s) _____
- GRAPHIC FORMS.** 37 CFR 1.84(d)
 - Chemical or mathematical formula not labeled as separate figure. Fig(s) _____
 - Group of waveforms not presented as a single figure, using common vertical axis with time extending along horizontal axis. Fig(s) _____
 - Individuals waveform not identified with a separate letter designation adjacent to the vertical axis. Fig(s) _____
- TYPE OF PAPER.** 37 CFR 1.84(c)
 - Paper not flexible, strong, white, smooth, nonshiny, and durable. Sheet(s) _____
 - Erasures, alterations, overwritings, interlineations, cracks, creases, and folds copy machine marks not accepted. Fig(s) _____
 - Mylar, velum paper is not acceptable (too thin). Fig(s) _____
- SIZE OF PAPER.** 37 CFR 1.84(f): Acceptable sizes:
 - 21.6 cm. by 35.6 cm. (8 1/2 by 14 inches)
 - 21.6 cm. by 33.1 cm. (8 1/2 by 13 inches)
 - 21.6 cm. by 27.9 cm. (8 1/2 by 11 inches)
 - 21.0 cm. by 29.7 cm. (DIN size A4)
 - All drawing sheets not the same size. Sheet(s) _____
 - Drawing sheet not an acceptable size. Sheet(s) _____
- MARGINS.** 37 CFR 1.84(g): Acceptable margins:

Paper size			
21.6 cm. X 35.6 cm. (8 1/2 X 14 inches)	21.6 cm. X 33.1 cm. (8 1/2 X 13 inches)	21.6 cm. X 27.9 cm. (8 1/2 X 11 inches)	21.0 cm. X 29.7 cm. (DIN Size A4)
T 5.1 cm. (2")	2.5 cm. (1")	2.5 cm. (1")	2.5 cm.
L .64 cm. (1/4")	.64 cm. (1/4")	.64 cm. (1/4")	2.5 cm.
R .64 cm. (1/4")	.64 cm. (1/4")	.64 cm. (1/4")	1.5 cm.
B .64 cm. (1/4")	.64 cm. (1/4")	.64 cm. (1/4")	1.0 cm.

 - Margins do not conform to chart above. Sheet(s) _____
 - Top (T) _____ Left (L) _____ Right (R) _____ Bottom (B) _____
- VIEWS.** 37 CFR 1.84(h)

REMINDER: Specification may require revision to correspond to drawing changes.

 - All views not grouped together. Fig(s) _____
 - Views connected by projection lines or lead lines. Fig(s) _____
 - Partial views. 37 CFR 1.84(h) 2
- View and enlarged view not labeled separately or properly. Fig(s) _____
- Sectional views. 37 CFR 1.84 (h) 3
- Hatching not indicated for sectional portions of an object. Fig(s) _____
- Cross section not drawn same as view with parts in cross section with regularly spaced parallel oblique strokes. Fig(s) _____
- ARRANGEMENT OF VIEWS.** 37 CFR 1.84(i)
 - Words do not appear on a horizontal, left-to-right fashion when page is either upright or turned so that the top becomes the right side, except for graphs. Fig(s) _____
- SCALE.** 37 CFR 1.84(k)
 - Scale not large enough to show mechanism with crowding when drawing is reduced in size to two-thirds in reproduction. Fig(s) _____
 - Indication such as "actual size" or scale 1/2" not permitted. Fig(s) _____
- CHARACTER OF LINES, NUMBERS, & LETTERS.** 37 CFR 1.84(l)
 - Lines, numbers & letters not uniformly thick and well defined, clean, durable, and black (except for color drawings). Fig(s) _____
- SHADING.** 37 CFR 1.84(m)
 - Solid black shading areas not permitted. Fig(s) _____
 - Shade lines, pale, rough and blurred. Fig(s) _____
- NUMBERS, LETTERS, & REFERENCE CHARACTERS.** 37 CFR 1.84(p)
 - Numbers and reference characters not plain and legible. 37 CFR 1.84(p)(1) Fig(s) _____
 - Numbers and reference characters not oriented in same direction as the view. 37 CFR 1.84(p)(1) Fig(s) _____
 - English alphabet not used. 37 CFR 1.84(p)(2) Fig(s) _____
 - Numbers, letters, and reference characters do not measure at least .32 cm. (1/8 inch) in height. 37 CFR(p)(3) Fig(s) 9-11
- LEAD LINES.** 37 CFR 1.84(q)
 - Lead lines cross each other. Fig(s) _____
 - Lead lines missing. Fig(s) _____
- NUMBERING OF SHEETS OF DRAWINGS.** 37 CFR 1.84(t)
 - Sheets not numbered consecutively, and in Arabic numerals, beginning with number 1. Sheet(s) _____
- NUMBER OF VIEWS.** 37 CFR 1.84(u)
 - Views not numbered consecutively, and in Arabic numerals, beginning with number 1. Fig(s) _____
 - View numbers not preceded by the abbreviation Fig. Fig(s) _____
- CORRECTIONS.** 37 CFR 1.84(w)
 - Corrections not made from prior PTO-948. Fig(s) _____
- DESIGN DRAWING.** 37 CFR 1.152
 - Surface shading shown not appropriate. Fig(s) _____
 - Solid black shading not used for color contrast. Fig(s) _____

COMMENTS:

DRAWING PAPER NO. _____

REVIEWER _____

DATE 2/3/96

CERTIFICATE OF MAILING. I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner of Patents, Washington, D.C. 20231, on: 6/5/97

HSA
W. Lawson
6/27/97

Helen Ford
(Typed or Printed Name of Person Mailing Paper or Fee)

H Ford
(Signature of Person Mailing Paper or Fee)



PATENT
Attorney Docket No. 16326.701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:)
)
Samual et al.)
)
Serial No.: 08/595,323)
)
Filing Date: February 1, 1996)
)
For: Server-Group Messaging System)
For Interactive Applications)

Examiner: Zarni Maung
Group Art Unit: 2315

RESPONSE TO OFFICE ACTION

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Office Action mailed March 20, 1997 in the present application, please consider the following amendments and remarks.

RECEIVED
JUN 25 97
GROUP 2600

AMENDMENT

IN THE CLAIMS:

Please cancel claims 1-6 and ~~13-16~~.

REMARKS

The Examiner has rejected claims 1-16. The Applicant has canceled claims 1-6 and 13-16. Thus, claims 7-12 are pending in this case.

1. **Rejection of Claims 7-12 Under 35 U.S.C. §103 Over Page in View of Perlman.**

The Examiner has rejected claims 7-12 as obvious over Page et al in view of Perlman et al. The Applicant respectfully traverses this rejection. In particular, claims 7-12 require the steps of

 sending, by a plurality of host computers belonging to a first message group, messages to said server . . . , said messages containing a payload portion . . . ;
 aggregating, by said server in a time interval determined in accordance with a predefined criterion, said payload portions of said messages to create an aggregated payload;
 forming an aggregated message using said aggregated payload

Page does not teach these claim elements. In particular, Page teaches a service broker that manages service requests and responsive services communicated between servers and clients. Page teaches three modes of communication: message processing, conversational communication, and remote procedure call.

None of Page's modes of communication aggregate payloads of messages into an aggregated payload where the payloads are being sent from a plurality of host computers. See Page, e.g. Col. 5, line 38 - Col. 6, line 68. None of Page's other features relate to aggregating payloads of messages being sent from a plurality of host computers.

The cleanup manager identified by the Examiner is a part of the service broker. The clean-up manager processes timeouts that have occurred. Please see Page, Col. 25, line 48 - Col. 27, line 42. It does not aggregate payloads of network messages. It recovers entries in various tables of the service broker for reuse. Please see Col. 27, lines 10-12.

Perlman does not overcome this deficiency of Page. Perlman involves a device that couples segments of an extended local area network such that messages that employ "inter-network protocols" will be handled without the difficulties usually associated with bridges and without the complexity and expense of full IP routers. Perlman does not teach aggregating payloads of messages.

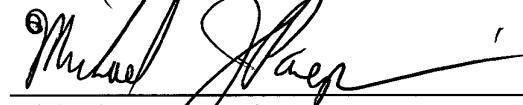
Accordingly, the combination of Page and Perlman does not teach the inventions of claims 7-12.

2. **Conclusion**

The Applicant respectfully requests reconsideration, allowance and passage to issue of the claims in light of the following amendments and remarks.

The Commissioner is hereby authorized to charge any additional fees, or to credit any overpayment required by this Preliminary Amendment, to Deposit Account No. 23-2415 (Our Docket No. 16227.703). A duplicate copy of this paper is enclosed.

Respectfully submitted,
WILSON, SONSINI, GOODRICH & ROSATI



Michael J. Panepucci
Registration No. 37,203

650 Page Mill Road
Palo Alto, CA 94304-1050
(415) 493-9300

Date: 6/5/97



2315

CERTIFICATE OF MAILING. I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner of Patents, Washington, D.C. 20231, on: 6/5/97

Helen Ford
(Typed or Printed Name of Person Mailing Paper or Fee)

[Signature]
(Signature of Person Mailing Paper or Fee)

PATENT
Attorney Docket No. 16326.701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
)
Samual et al.)
)
Serial No.: 08/595,323)
)
Filing Date: February 1, 1996)
)
For: Server-Group Messaging System)
For Interactive Applications)

Examiner: Zarni Maung
Group Art Unit: 2315

RECEIVED
JUN 25 97
GROUP 2600

AMENDMENT TRANSMITTAL LETTER

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In connection with the above-referenced U. S. patent application, transmitted herewith are the following papers:

- Response under 37 C.F.R. § 1.111 to official action mailed March 20, 1997.
- _____ verified statement(s) claiming small entity status
- are also enclosed were submitted previously.
- A Petition for Extension of Time is also enclosed.
- No additional fee is required.

An additional fee is required, and is calculated as shown below:

AMENDED CLAIMS					
	NO. OF CLAIMS	HIGHEST NO. OF CLAIMS PREVIOUSLY PAID FOR	EXTRA CLAIMS	RATE	ADD'TL FEE
Total Claims	16	MINUS = 16	0	x \$22 =	0
Independent Claims	3	MINUS = 3	0	x \$80 =	0
If Amendment adds multiple dependent claims, add \$260.00					
Total Amendment Fee					
If small entity status is claimed, subtract 50% of Total Amendment Fee					
TOTAL ADDITIONAL FEE DUE FOR THIS AMENDMENT					0

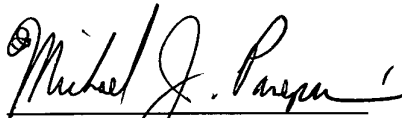
A check in the amount of \$___ is enclosed.

Charge \$__ to Deposit Account No. 23-2415 (Docket No. 16326-701).

The Commissioner is hereby authorized to charge any additional fees that may be required by this paper, and to credit any overpayment, to Deposit Account No. 23-2415 (Docket No. 16326-701). A duplicate of this paper is enclosed.

Respectfully submitted,

WILSON, SONSINI, GOODRICH & ROSATI

By: 

Michael J. Panepucci
Registration No. 37,203

650 Page Mill Road
Palo Alto, CA 94304-1050
(415) 493-9300

Date: June 5, 1997

::ODMA\PCDOCS\SQL1\151575\1

Move Text Search Close

02 JUL 1997 16:21:48 U.S. Patent & Trademark Office P0011

US PAT NO: 5,486,864 [IMAGE AVAILABLE] L7: 2 of 3

CLMS(11)

intervals that said multiplexing means does not accept signal from said one of said plurality of input terminals; and includes; a source of clock pulses; means for measuring the transit **time** of signal passed through said storage buffer in units of said clock pulses; and means for incrementing, by the measured transit **time**, values contained in said further data field in transport packets passed through said storage buffer.

US PAT NO: 4,506,852 [IMAGE AVAILABLE] L7: 3 of 3

SUMMARY:

BSUM(10)

This . . . in an arrangement using a single instrumentality for simultaneously imparting both linear and angular momentum to the payload at the **time** of deployment. This single instrumentality is a spring arrangement comprising two or more canted springs **compressed** between launch vehicle structure and **payload** structure. The payload is releasably secured to the launch vehicle. Release is achieved in a manner obviating unbalanced or delayed. . . the spin imparted to the payload as the canted springs extend, stabilizes the payload during and after the spring thrust **interval**.

=> d his

(FILE 'USPAT' ENTERED AT 15:50:39 ON 02 JUL 1997)

SET PAGELength 62
SET LINELENGTH 78

- L1 87 S UNICAST?
- L2 23 S AGGREGA? (P) PAYLOAD#\
- L3 0 S (COMBIN? OR COMPRESS?) (6A) APYLOAD#
- L4 231 S (COMBIN? OR COMPRESS?) (6A) PAYLOAD#
- L5 0 S L1 AND L4
- L6 1 S L4 (P) MESSAGE#
- L7 3 S L4 (P) TIME (P) INTERVAL#

=> s 14 and network#

132361 NETWORK#

L8 58 L4 AND NETWORK#

=>

INPUT:



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: Box ISSUE FEE
ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

NOTICE OF ALLOWANCE AND ISSUE FEE DUE

B3M1/0709

HC CHAN
WILSON SONSINI GOODRICH & ROSATI
650 PAGE MILL RD
PALO ALTO CA 94304

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT	DATE MAILED
08/595,323	02/01/96	006	MAUNG, Z	2315 07/09/97
First Named Applicant	SAMUEL, DANIEL J.			

TITLE OF INVENTION SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2	16326.701	395-200.170	P16 UTILITY	YES	\$645.00	10/09/97

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED.

THE ISSUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

HOW TO RESPOND TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above. If the SMALL ENTITY is shown as yes, verify your current SMALL ENTITY status:

- A. If the status is changed, pay twice the amount of the FEE DUE shown and notify the Patent and Trademark Office of the change in status, or
- B. If the status is the same, pay the FEE DUE shown above.

If the SMALL ENTITY is shown as NO:

- A. Pay FEE DUE shown above, or
- B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

II. Part B of this notice should be completed and returned to the Patent and Trademark Office (PTO) with your ISSUE FEE. Even if the ISSUE FEE has already been paid by charge to deposit account, Part B should be completed and returned. If you are charging the ISSUE FEE to your deposit account, section "6b" of Part B should be completed.

III. All communications regarding this application must give application number and batch number. Please direct all communication prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.



UNITED STATES DEPARTMENT OF COMMERCE
 Patent and Trademark Office
 Address: COMMISSIONER OF PATENTS AND TRADEMARKS
 Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	D	ATTORNEY DOCKET NO.
08/595,323	02/01/96	SAMUEL		18326.701

B3M1/0709
 HC CHAN
 WILSON SONSINI GOODRICH & ROSATI
 650 PAGE MILL RD
 PALO ALTO CA 94304

EXAMINER
MAUNG, Z

ART UNIT	PAPER NUMBER
2313	

07/09/97

DATE MAILED:

NOTICE OF ALLOWABILITY

PART I.

- This communication is responsive to the amendment and remarks filed on 6/9/97.
- All the claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice Of Allowance And Issue Fee Due or other appropriate communication will be sent in due course.
- The allowed claims are 7-12
- The drawings filed on _____ are acceptable.
- Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has [] been received, [] not been received. [] been filed in parent application Serial No. _____, filed on _____.
- Note the attached Examiner's Amendment.
- Note the attached Examiner Interview Summary Record, PTOL-413.
- Note the attached Examiner's Statement of Reasons for Allowance.
- Note the attached NOTICE OF REFERENCES CITED, PTO-892.
- Note the attached INFORMATION DISCLOSURE CITATION, PTO-1449.

PART II.

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE THREE MONTHS FROM THE "DATE MAILED" indicated on this form. Failure to timely comply will result in the ABANDONMENT of this application. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

- Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION, PTO-152, which discloses that the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.
- APPLICANT MUST MAKE THE DRAWING CHANGES INDICATED BELOW IN THE MANNER SET FORTH ON THE REVERSE SIDE OF THIS PAPER.
 - Drawing informalities are indicated on the NOTICE RE PATENT DRAWINGS, PTO-948, attached hereto or to Paper No. 4. CORRECTION IS REQUIRED.
 - The proposed drawing correction filed on _____ has been approved by the examiner. CORRECTION IS REQUIRED.
 - Approved drawing corrections are described by the examiner in the attached EXAMINER'S AMENDMENT. CORRECTION IS REQUIRED.
 - Formal drawings are now REQUIRED.

Any response to this letter should include in the upper right hand corner, the following information from the NOTICE OF ALLOWANCE AND ISSUE FEE DUE: ISSUE BATCH NUMBER, DATE OF THE NOTICE OF ALLOWANCE, AND SERIAL NUMBER.

Attachments:

- Examiner's Amendment
- Examiner Interview Summary Record, PTOL-413
- Reasons for Allowance
- Notice of References Cited, PTO-892
- Information Disclosure Citation, PTO-1449
- Notice of Informal Application, PTO-152
- Notice re Patent Drawings, PTO-948
- Listing of Bonded Draftsmen
- Other

WILLIAM M. TREAT
 PRIMARY EXAMINER
 GROUP 2300

Serial Number: 08/595,323

Page 2

Art Unit: 2315

1. An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R. § 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the Issue Fee.

2. Authorization for this Examiner's Amendment was given in a telephone interview with Mr. Michael J. Panepucci on July 3, 1997.

3. In the drawings

Please insert -- Prior Art -- legends under figures 1-4.



WILLIAM M. TREAT
PRIMARY EXAMINER
GROUP 2300



Ex 1003 \$
#12

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on July 17, 1997

Drew R. Herndon

(Typed or Printed Name of Person Mailing Paper or Fee)

Drew R. Herndon

(Signature of Person Mailing Paper or Fee)

Attorney Docket No. 16326701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)

Daniel J. Samuel et al.)

Application No. 08/595,323)

Filed: February 1, 1996)

For: SERVER-GROUP MESSAGING SYSTEM)
FOR INTERACTIVE APPLICATIONS)

RECEIVED

MAY - 6 1998

OFFICE OF PETITIONS
A/C PATENTS

Group Art Unit: 2315

Examiner: Z. Maung

Batch No.: P16

Allowed: July 9, 1997

PATENT RECEIVED
JUL 12 97
GROUP 2600
PT 31 97
GROUP 2600

PETITION UNDER 37 C.F.R. § 1.182

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

NOV - 5 1997

Received

APR 22 1998

Director's Office
Group 2700

C11C
C11F - 11/4

Applicants hereby petition the Assistant Commissioner to change the order of the listing of inventors in the above-identified patent application.

The inventors are listed in the following order on the Official Filing Receipt:

- (1) Daniel J. Samuel, Sunnyvale, CA
- (2) Jeffrey J. Rothschild, Los Gatos, CA
- (3) Jeffrey J. Rothschild, Los Gatos, CA

08/11/1997 AHAYES 000013/1000-732415 via 08595323
01 FC:122 130.00 CH

The order in which the inventors are listed should be changed to the following:

- (1) Jeffrey J. Rothschild, Los Gatos, CA
- (2) Marc P. Kwiatowski, Los Gatos, CA
- (3) Daniel J. Samuel, Sunnyvale, CA

Application No. 08/595,323

A Notice of Allowance dated July 9, 1997 (Batch No. P16) has been received in this application, and therefore Applicants request the above change so that any patent to issue from this application will reflect Jeffrey J. Rothschild as the lead inventor.

This Petition does not involve any change in inventorship and therefore Applicants believe that no Petition under 37 CFR § 1.48 is necessary in this case. Should the Examiner require any further filing from Applicants in connection with this Petition he is urged to contact the undersigned attorney by telephone as soon as possible so that the issue may be resolved prior to issuance of the application. The undersigned may be reached at (415) 493-9300.

The Assistant Commissioner is authorized to charge the Petition Fee of **\$ 130.00** under 37 CFR 1.17(h), including any additional fees which may be required, or credit any overpayment to Deposit Account No. 23-2415 (Docket No. 16326.701). A duplicate copy of this paper is enclosed.

Respectfully submitted,

WILSON SONSINI GOODRICH & ROSATI

By:



Mark A. Haynes
Registration No. 30,846

650 Page Mill Road
Palo Alto, California 94304
(415) 493-9300

July 17, 1997

CERTIFICATE OF MAILING
I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on August 20, 1997

Patricia E. Shepherd
(Typed or Printed Name of Person Mailing Paper or Fee)

Patricia E. Shepherd
(Signature of Person Mailing Paper or Fee)

70831
AUG 25 1997
PATENT & TRADEMARK OFFICE

350/200.170
094 > 127/98
47MO-0380 #15
6/12/98

0380
7560

Attorney Docket No.: 16326-701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Daniel J. Samuel et al.

Application No.: 08/595,323

Filed: February 1, 1996

Title: SERVER-GROUP MESSAGING SYSTEM
FOR INTERACTIVE APPLICATIONS

Issue Batch No.: P16

Group Art Unit: 2315

Examiner: Z. Maung

RECEIVED
ALLOWED FILES/NOTES
PUBLICATION DIVISION
97 SEP 18 PM 2:55

INTERVIEW SUMMARY

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Examiner Z. Maung contacted me on July 3, 1997 for a brief telephone interview. No exhibits were shown, no demonstration was conducted and no claims were discussed.

The Examiner requested the changes shown in the Examiner's Amendment contained in the Notice of Allowability dated July 9, 1997. The Applicant approved these changes.

The Commissioner is authorized to charge any additional fees which may be required or credit any overpayment to Deposit Account No. 23-2415 (Our Docket No. 16326-701). A duplicate copy of this page is enclosed.

Respectfully submitted,

WILSON SONSINI GOODRICH & ROSATI

By: *Michael J. Panepucci*
Michael Panepucci
Registration No. 37,203

Date: 8/20/97

650 Page Mill Road
Palo Alto, CA 94304-1050
(415) 493-9300

H:\HOME\WJPM\PATH\701\INT\VWSUM.701

PART B—ISSUE FEE TRANSMITTA

16326-701
242 W. MATH MAH

MAILING INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE. Blocks 2 through 6 should be completed where appropriate. All further correspondence including the Issue Fee Receipt, the Patent, advance orders and notification of maintenance fees will be mailed to addresses entered in Block 1 unless you direct otherwise, by: (a) specifying a new correspondence address in Block 3 below; or (b) providing the PTO with a separate "FEE ADDRESS" for maintenance fee notifications with the payment of Issue Fee or thereafter. See reverse for Certificate of Mailing, below.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending on the needs of the individual case. Any comments on the amount of time required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, D.C. 20231.

DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Issue Fee, Assistant Commissioner for Patents, Washington D.C. 20231

1. CORRESPONDENCE ADDRESS

B3M1/0709

HC CHAN
WILSON SONSINI GOODRICH & ROSATI
650 PAGE MILL RD
PALO ALTO CA 94304

E

2. INVENTOR(S) ADDRESS CHANGE (Complete only if there is a change)

INVENTOR'S NAME

Street Address **RECEIVED**

City, State and Zip Code **Division**

CO-INVENTOR'S NAME **SEP 22 1997**

Street Address

City, State and Zip Code **08**

Check if additional changes are enclosed

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT	DATE MAILED
08/595,323	02/01/96	006	MAUNG, Z	2315 07/09/97
First Named Applicant	SAMUEL, DANIEL J.			

TITLE OF INVENTION SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2	16326.701	395-200.170	P16 UTILITY	YES	\$645.00	10/09/97

3. Correspondence address change (Complete only if there is a change)

H. C. Chan
1072 South De Anza Blvd.
Suite 302
San Jose, CA 95129

4. For printing on the patent front page, list the names of not more than 3 registered patent attorneys or agents OR, alternatively, the name of a firm having as a member a registered attorney or agent. If no name is listed, no name will be printed.

1 H. C. Chan
2 Wilson Sonsini Goodrich & Rosati
3 _____

5. ASSIGNMENT DATA TO BE PRINTED ON THE PATENT (print or type)

(1) NAME OF ASSIGNEE: Mpath Interactive, Inc.

(2) ADDRESS: (CITY & STATE OR COUNTRY) Mountain View, CA

A. This application is NOT assigned.
 Assignment previously submitted to the Patent and Trademark Office.
 Assignment is being submitted under separate cover. Assignment should be directed to Box ASSIGNMENTS.

PLEASE NOTE: Unless an assignee is identified in Block 5, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the PTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

6a. The following fees are enclosed:
 Issue Fee Advance Order - # of Copies _____

6b. The following fees should be charged to:
DEPOSIT ACCOUNT NUMBER 03-1243
(ENCLOSE A COPY OF THIS FORM)
 Issue Fee Advance Order - # of Copies 10
 Any Deficiencies in Enclosed Fees

The COMMISSIONER OF PATENTS AND TRADEMARKS is requested to apply the Issue Fee to the application identified above.

(Authorized Signature) [Signature] (Date) 9/18/97

NOTE: The Issue Fee will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee of other party in interest as shown by the records of the Patent and Trademark Office.

Certificate of Mailing

Note: If this certificate of mailing is used, it can be used to transmit the Issue Fee. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: **Box ISSUE FEE**
Assistant Commissioner for Patents
Washington, D.C. 20231

on: September 19, 1997 (Date)
H. C. Chan (Name of person making deposit)
[Signature] (Signature)
Sept 19, 1997 (Date)

11/10/1997 URGENT 0000120 0M:031243 08595323
02-11-97 30:00 CH 645.00 00

#1
DM

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8 - FIRST CLASS MAIL
I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Box Issue Fee Assistant Commissioner for Patents, Washington, D.C. 20231.

Chan 10/4/97
H. C. Chan Date

PATENT
Attorney Docket No. 16326.701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
Daniel Samuel et al.	)	Group Art Unit: 2315
)	
Serial No.: 08/595,323	)	Examiner: Maung, Z.
)	
Filed: February 1, 1996	)	Batch No. P16
)	
For: Server Group Messaging System for)	
Interactive Applications)	

FORMAL DAWINGS TRANSMITTAL LETTER

Box Issue Fee
Assistant Commissioner for Patents
Washington, D.C. 20231

OCT 07 1997
00

Sir:

Enclosed are formal drawings for the above-identified patent application.
 A Petition for Extension of Time is also enclosed.
 No additional fee is required.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 03-1243 (Our Docket No. 16326.701). A duplicate of this paper is enclosed.

Respectfully submitted,

Chan
H. C. Chan
Registration No. 35,477

Date: October 4, 1997

1072 S. De Anza Blvd. Ste 302
San Jose, CA 95129
Phone: (408) 882-5063

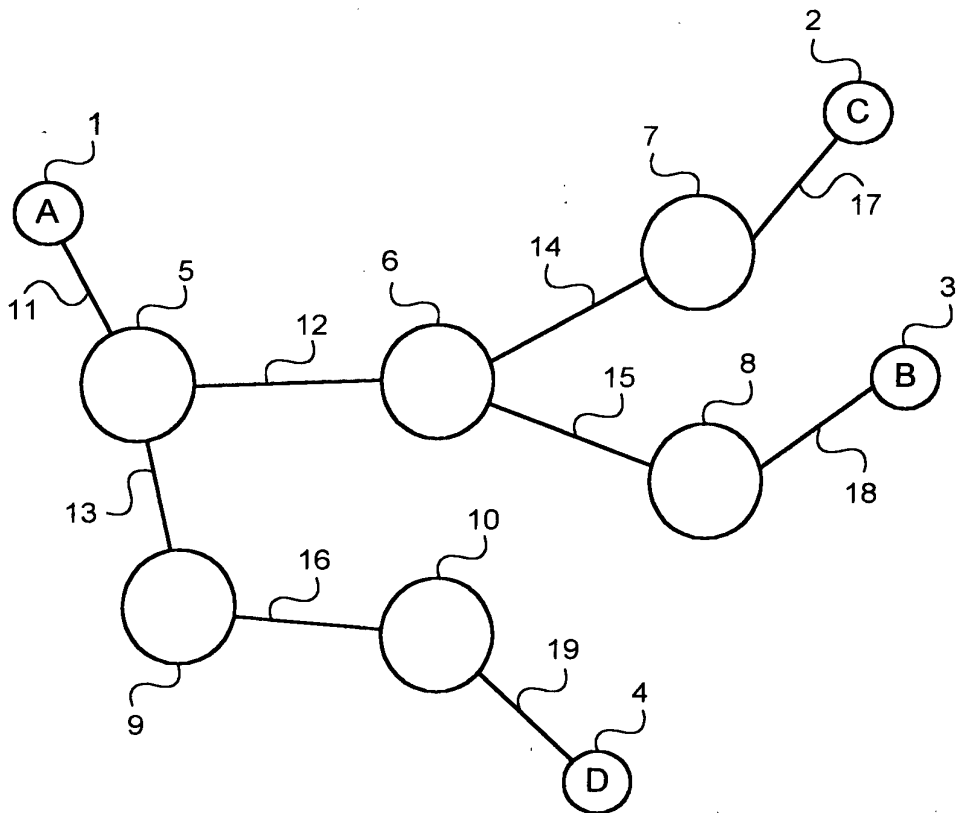


Figure 1
Prior Art - Unicast Network

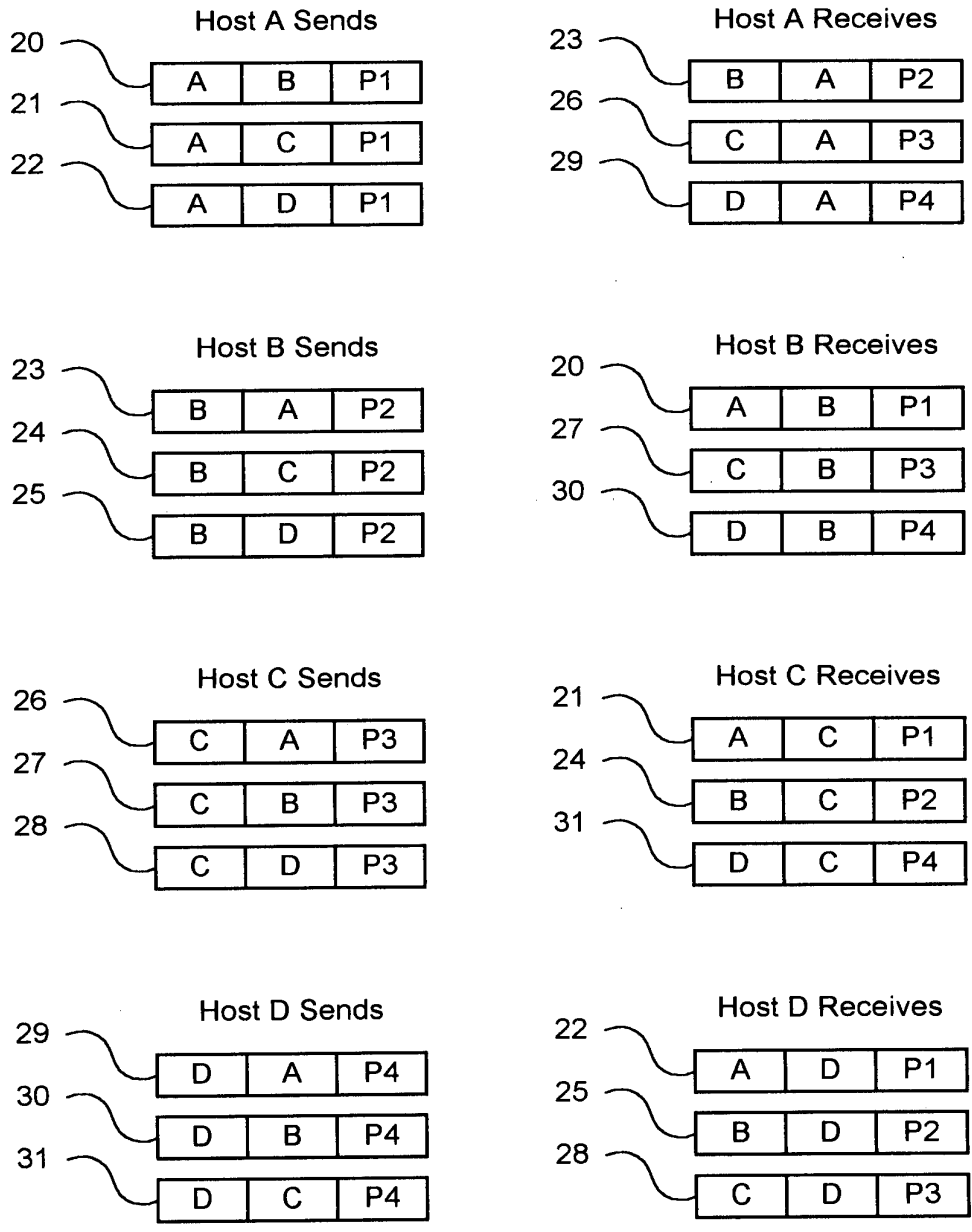


Figure 2
Prior Art - Unicast Datagrams

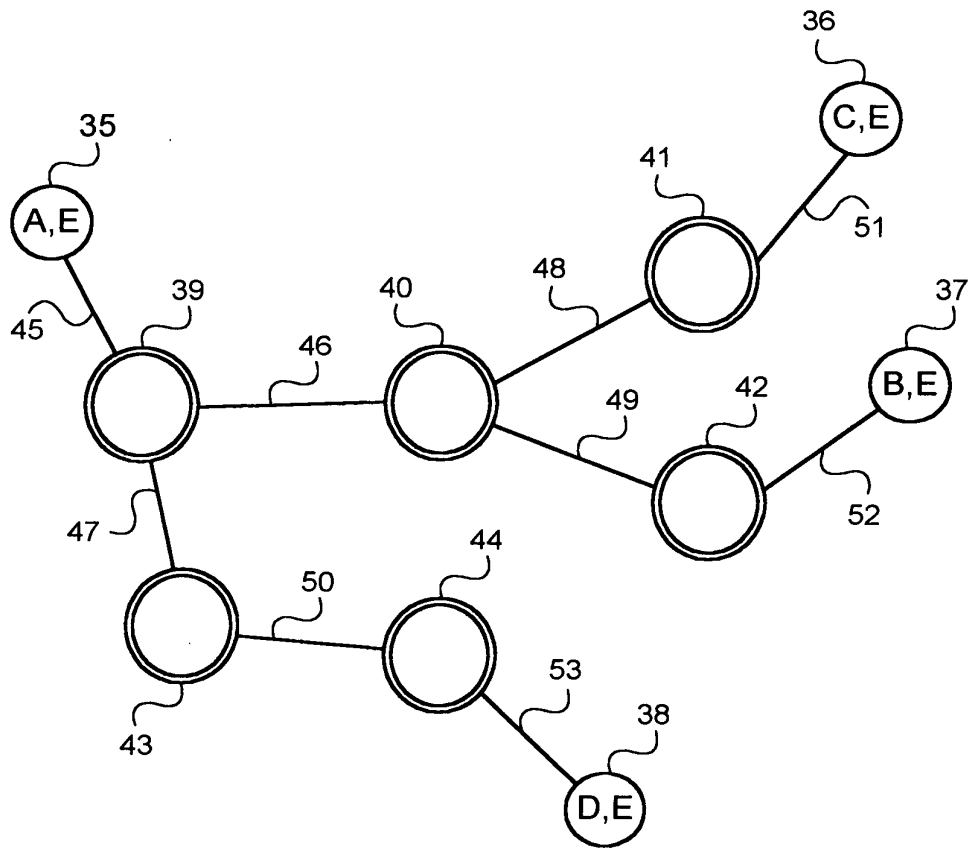


Figure 3
Prior Art - Multicast Network

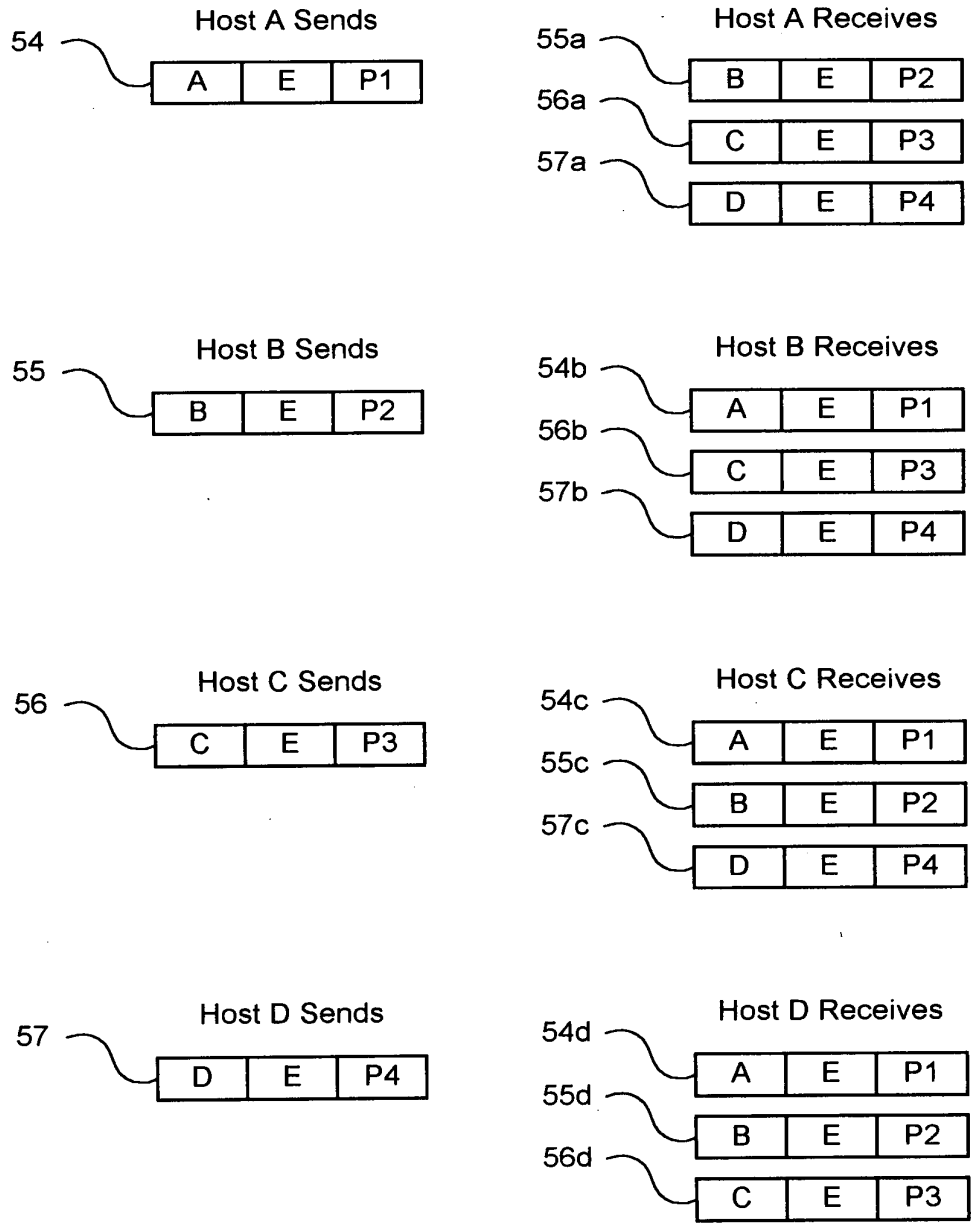


Figure 4
Prior Art - Multicast Datagrams

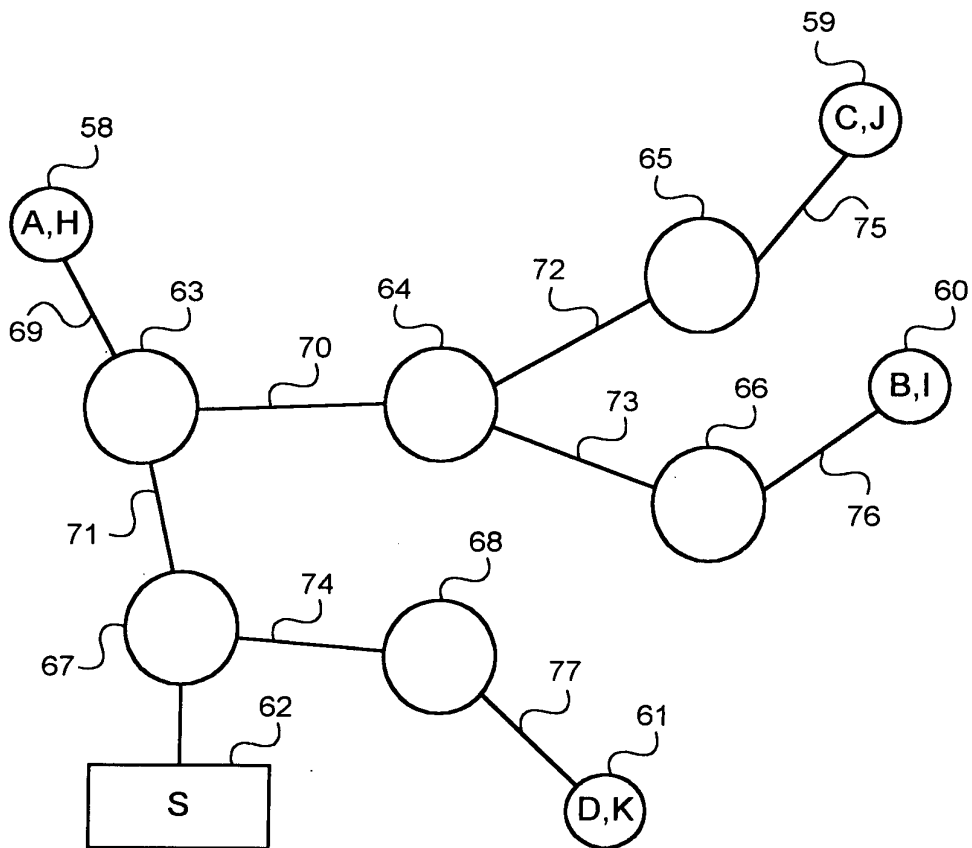


Figure 5
Present Invention - Unicast Network with Group Server

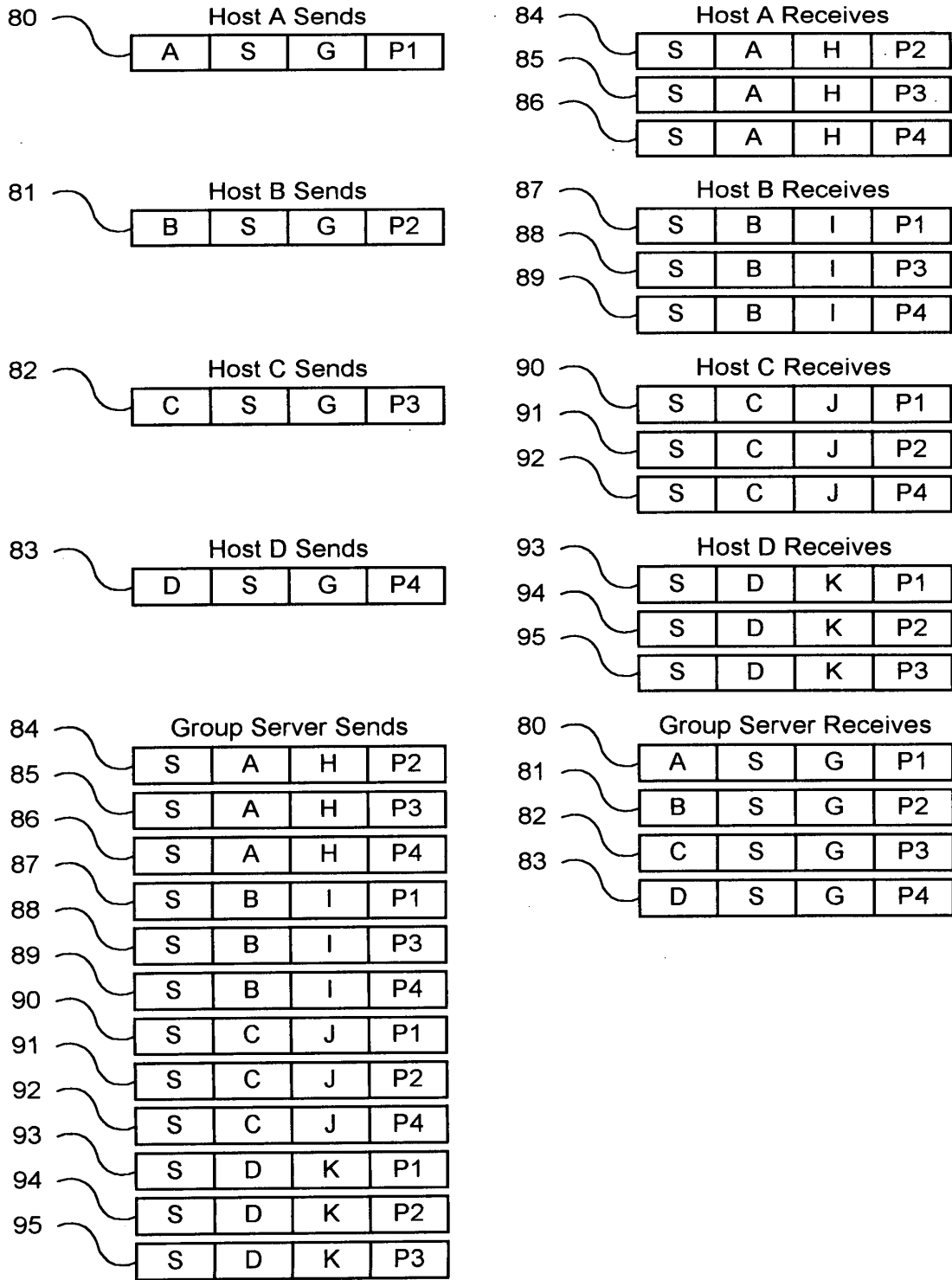


Figure 6
Present Invention - Group Datagrams without Aggregation

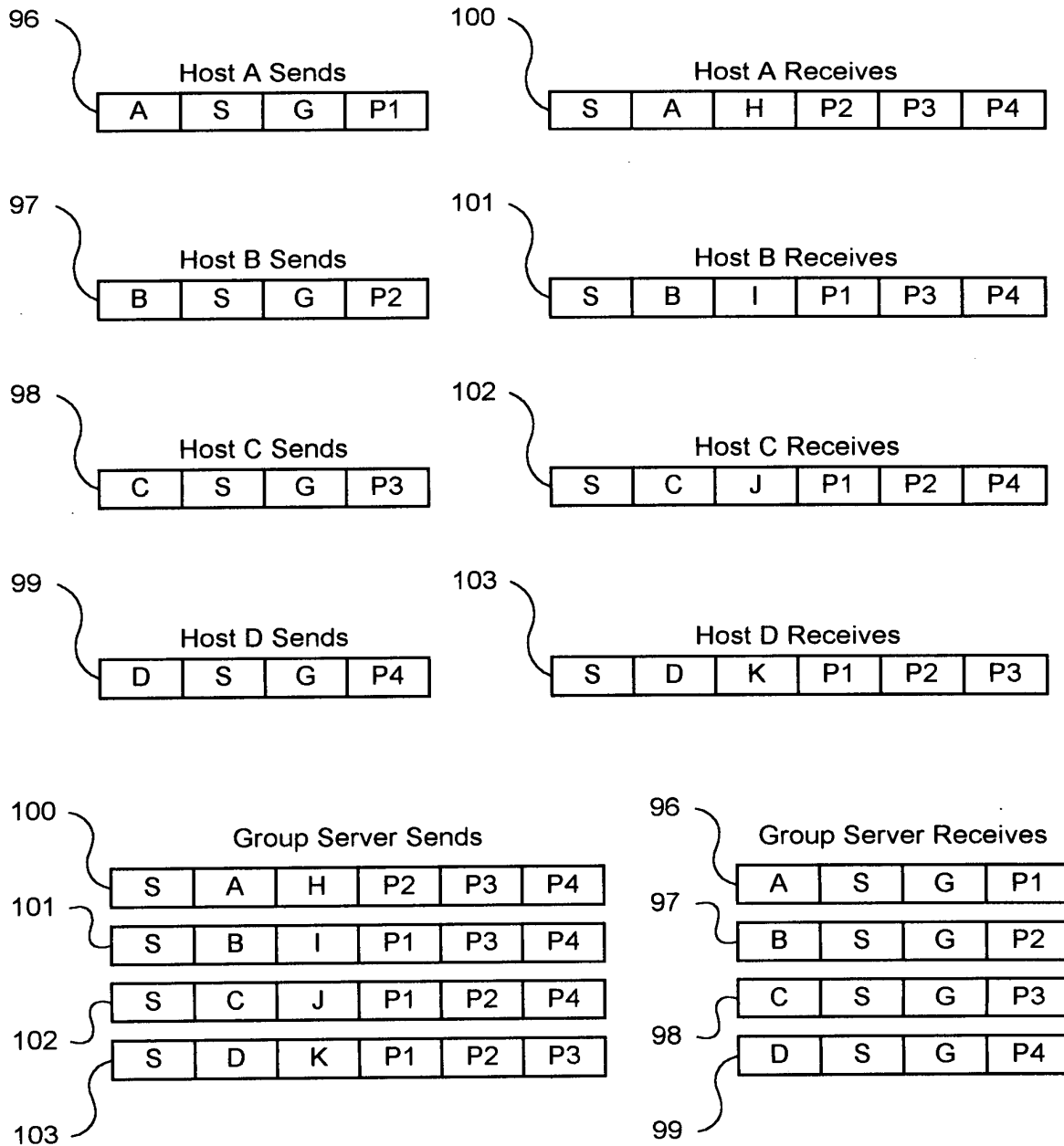


Figure 7
Present Invention - Group Datagrams with Aggregation

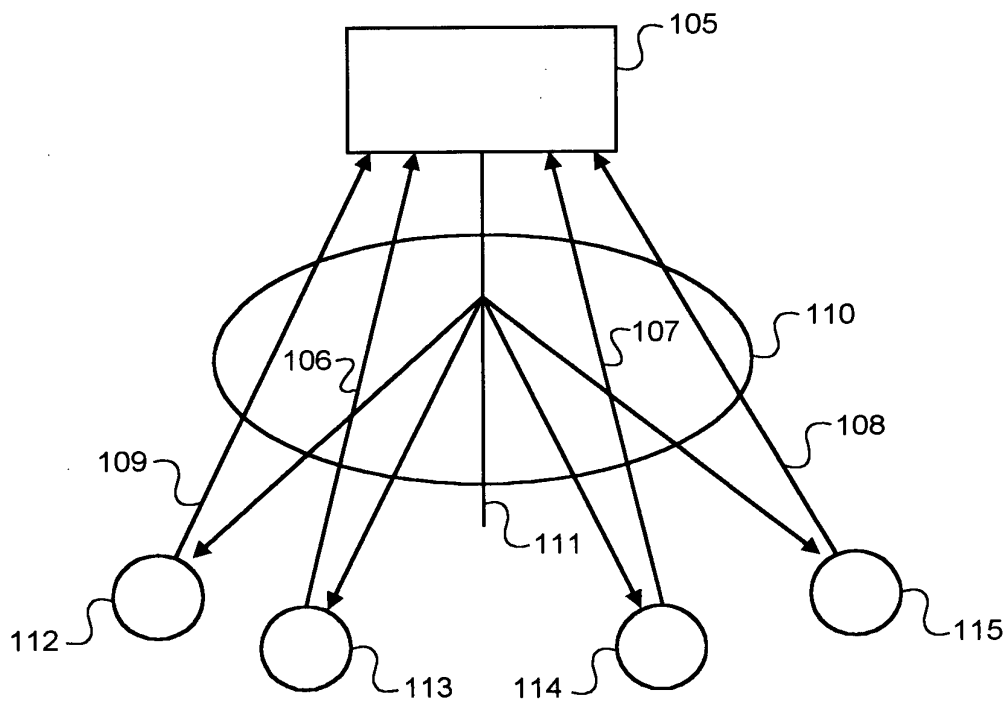


Figure 8
Prior Art - ATM Network with Multicast Server

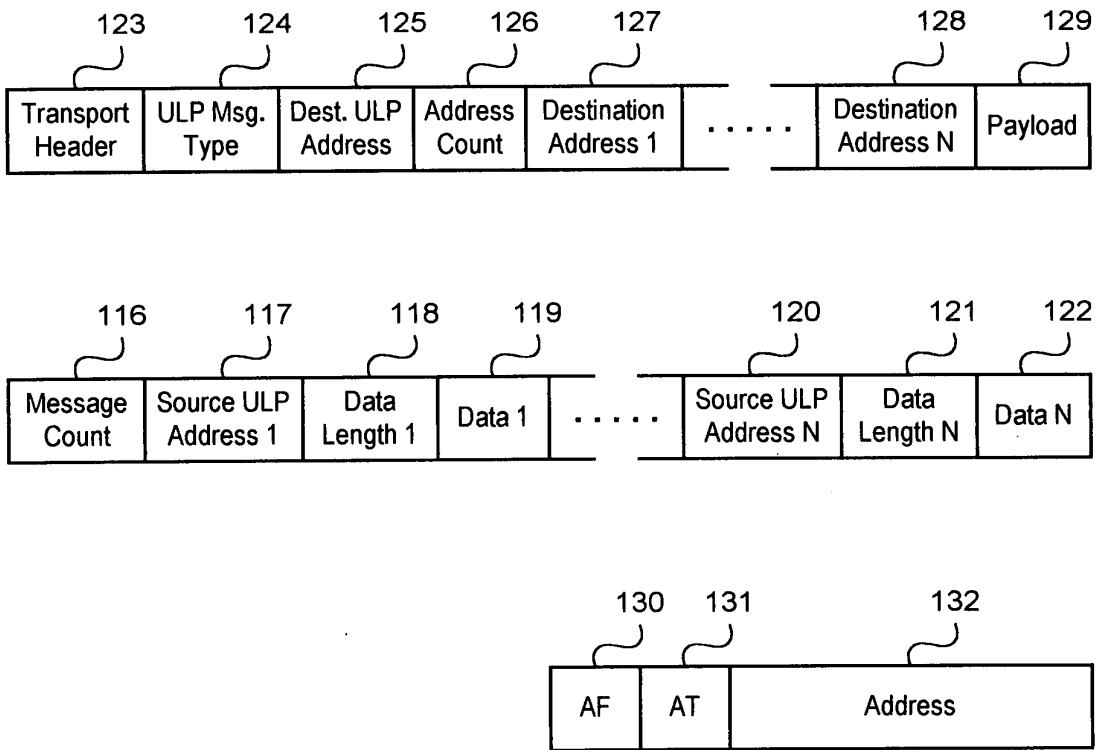


Figure 9
Invention - ULP Message and Address Formats

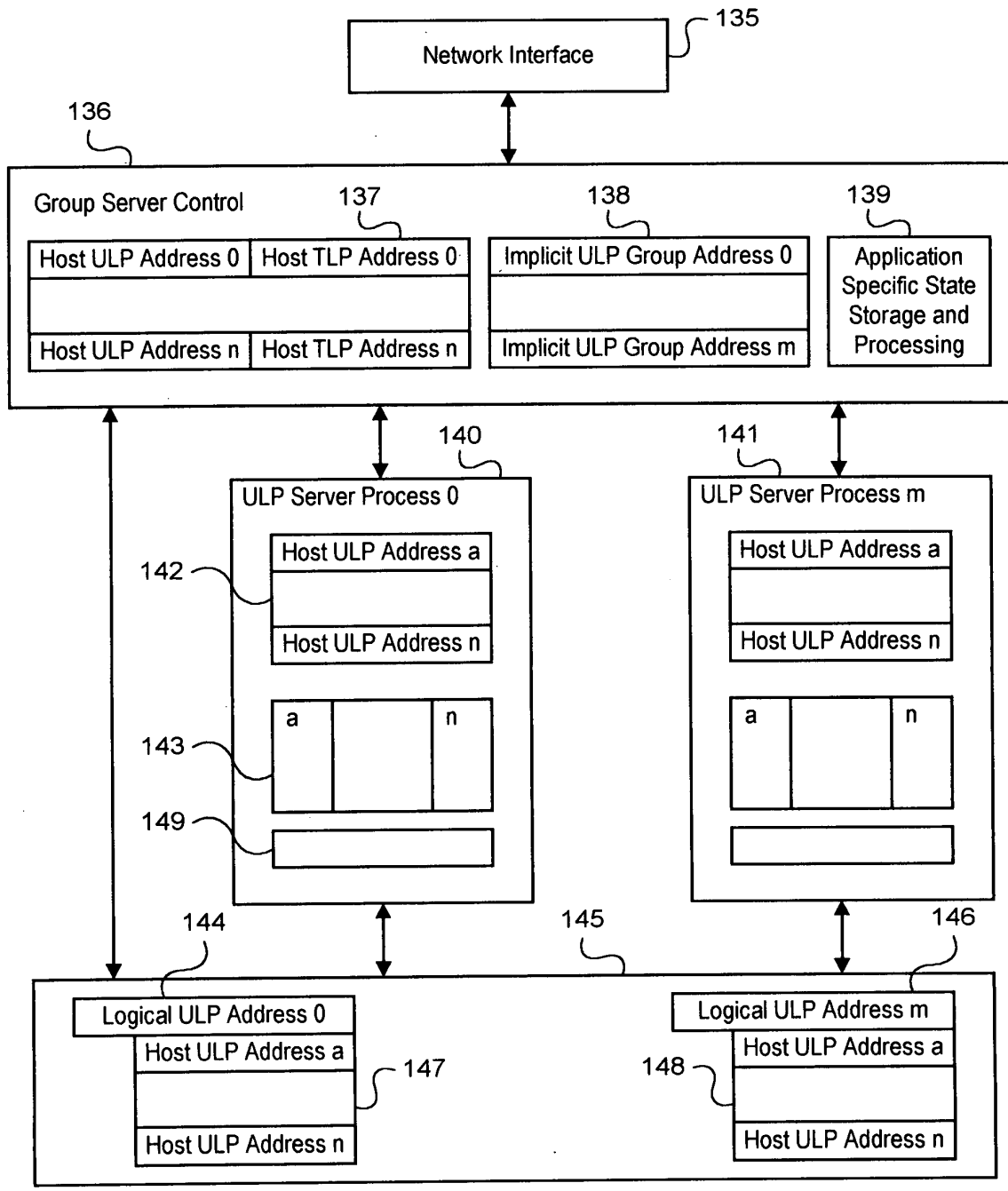


Figure 10
Invention - Group Server Internal Functions

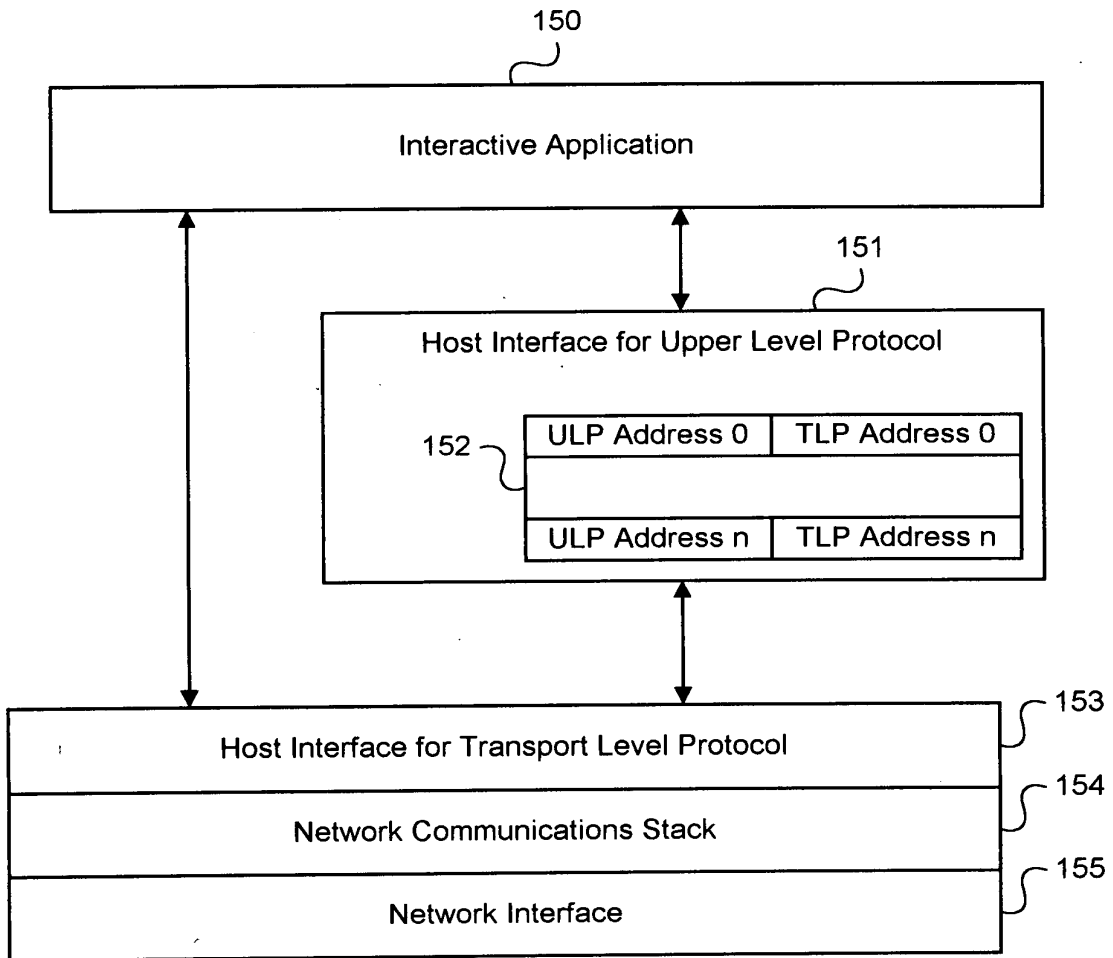


Figure 11
Invention - Host Interface for Upper Level Protocol

9

PATENT

CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States
Postal Service as first class mail in an envelope addressed to: Assistant Commissioner
for Patents, Washington, D.C. 20231.



H. C. Chan

10/21/97
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
	)	Examiner: Maung, Z
Daniel Samuel, et al.)	
	)	Group Art Unit: 2315
Serial No. 08/595,323)	
	)	Batch No.: P16
Filed: February 1, 1996)	
)	
For: Server-Group Messaging System for)	
Interactive Applications)	

CHANGE OF CORRESPONDENCE ADDRESS

~~RECEIVED~~
Publishing Division

Assistant Commissioner for Patents
Washington, D.C. 20231

OCT 23 1997 /

Dear Sir:

11

Please direct all future correspondence related to the above-identified patent application
to:

H. C. Chan
1072 South De Anza Blvd. Suite 302
San Jose, CA 95129

Phone: (408) 882-5063
Fax: (408) 252-6178.

The undersigned is an attorney of record of the above-identified patent application.

Sincerely,



Hark C. Chan
Reg. No.: 35,477

Date: October 20, 1997



PATENT
Attorney Docket No. 16326.701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
	)	Examiner: Maung, Z
Daniel Samuel, et al.)	
	)	Group Art Unit: 2315
Serial No. 08/595,323)	
	)	Batch No.: P16
Filed: February 1, 1996)	
)	
For: Server-Group Messaging System for)	
Interactive Applications)	

REVOCATION AND NEW POWER OF ATTORNEY
BY ASSIGNEE OF ENTIRE INTEREST

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

As the Assignee of the entire interest in the above-identified patent application, all powers of attorney previously given are hereby revoked. **Hark C. Chan, Registration No. 35,477**, is hereby appointed to prosecute and transact all business in the U.S. Patent and Trademark Office connected with the above-identified application.

The following evidentiary documents establish a chain of title from the original owner to the Assignee:

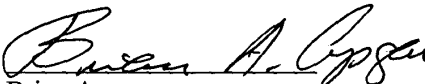
- a copy of an Assignment attached hereto, which Assignment has been forwarded on July 18, 1997 to the Patent and Trademark Office for recording; or
- the Assignment recorded on 02/01/1996 at reel 7861, frames 0413.

Pursuant to 37 C.F.R. 3.73(b) the undersigned Assignee hereby states that evidentiary documents have been reviewed and hereby certified that, to the best of Assignee's knowledge and belief, title is in the identified Assignee.

Please direct all telephone calls and correspondence to:

H. C. Chan
1072 South De Anza Blvd.
Suite 302
San Jose, CA 95129
(408) 882-5063

ASSIGNEE: Mpath Interactive, Inc.

By: 
Brian Apgar
Executive Vice President, Development

11/11/97
Date



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
 ASSISTANT SECRETARY AND COMMISSIONER
 OF PATENTS AND TRADEMARKS
 Washington, D.C. 20231

JUNE 17, 1996

PTAS
 WILSON, SONSINI, GOODRICH & ROSATI
 H. C. CHAN
 650 PAGE MILL ROAD
 PALO ALTO, CA 94304-1050



UNITED STATES PATENT AND TRADEMARK OFFICE
 NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, NORTH TOWER BUILDING, SUITE 10C35, WASHINGTON, D.C. 20231.

RECORDATION DATE: 02/01/1996

REEL/FRAME: 7861/0413
 NUMBER OF PAGES: 4

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

SAMUEL, DANIEL JOSEPH

DOC DATE: 01/30/1996

ASSIGNOR:

KWIATKOWSKI, MARC PETER

DOC DATE: 01/30/1996

ASSIGNOR:

ROTHSCHILD, JEFFREY JACKIEL

DOC DATE: 01/30/1996

ASSIGNEE:

MPATH INTERACTIVE, INC.
 10455-A BANDLEY DRIVE
 CUPERTINO, CALIFORNIA 95014

SERIAL NUMBER: 08595323
 PATENT NUMBER:

FILING DATE: 02/01/1996
 ISSUE DATE:



CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

H. C. Chan
H. C. Chan

Nov. 17, 1997
Date

RECEIVED

DEC 23 1998

Publishing Division
Corres/Allowed Files (08)

410B
TV
26/98
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
	)	Examiner: Maung, Z
Daniel Samuel, et al.)	
	)	Group Art Unit: 2315
Serial No. 08/595,323)	
	)	Batch No.: P16
Filed: February 1, 1996)	
)	
For: Server-Group Messaging System for)	
Interactive Applications)	

TRANSMITTAL LETTER FOR SUBMISSION OF REVOCATION AND NEW POWER OF ATTORNEY BY ASSIGNEE OF ENTIRE INTEREST

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Enclosed is a "Revocation And New Power Of Attorney By Assignee Of Entire Interest" signed by an authorized officer of the Assignee. A copy of the Notice of Recordation of Assignment Document issued by the Patent and Trademark Office is also enclosed.

The Commissioner is authorized to charge any additional fees which may be required, including petition fees, or credit any overpayment to Deposit Account No. 03-1243 (Docket No. 16326.701) A duplicate copy of this paper is enclosed.

Respectfully submitted,

Hark C. Chan
Reg. No.: 35,477

Date: November 17, 1997



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/595,323	02/01/96	SAMUEL	D 16326.701

4102/1205

HC CHAN
WILSON SONSINI GOODRICH & ROSATI
650 PAGE MILL RD
PALO ALTO CA 94304

EXAMINER	
MAUNG, Z	
ART UNIT	PAPER NUMBER
2315	8

DATE MAILED: 12/06/97
12/8/97

NOTICE OF DRAWING REQUIREMENTS

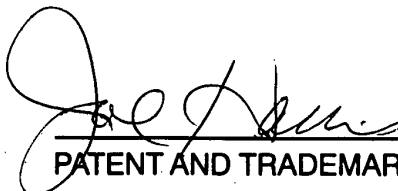
Corrected/substituted drawings for the above-identified application, received in the PTO on 10/29/97, are still considered informal for the reason(s) identified on the attached Form PTO-948.

Applicant has the time remaining in the response period set in the Notice of Allowability or Notice of Drawing Requirements mailed _____ to overcome the objections raised in the attached Form PTO-948. This response period may be extended under the provisions of 37 CFR 1.136 (a) by filing the appropriate request and fee before the end of the six month statutory period for response.

The PTO delayed in reviewing the corrected drawings. Applicant is given ONE month time limit from the date of this letter to provide corrected drawings. **NO EXTENSION OF THIS TIME LIMIT MAY BE GRANTED UNDER EITHER 37 CFR 1.136(a) or (b). See MPEP 714.03.** However, the response period set in the Notice of Allowability or Notice of Drawing Requirements mailed _____ may be extended under the provisions of 37 CFR 1.136(a) by filing the appropriate request and fee before the end of the six month statutory period for response.

The PTO delayed in reviewing the corrected drawings. Applicant is given ONE month time limit from the date of this letter to provide corrected drawings. **NO EXTENSION OF THIS TIME LIMIT MAY BE GRANTED UNDER EITHER 37 CFR 1.136(a) or (b). See MPEP 714.03**

ATTACHMENT: PTO-948


PATENT AND TRADEMARK OFFICE

1/18/97
DATE

Handwritten initials: (A) NM



Handwritten initials: 2/28/98 MATHIAS

Handwritten: 4100 (C) B #14

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8 - FIRST CLASS MAIL
I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Box Issue Fee Assistant Commissioner for Patents, Washington, D.C. 20231.

H. C. Chan
H. C. Chan

Jan 14, 1998
Date

PATENT
Attorney Docket No. 16326.701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
Daniel Samuel et al.	)	Group Art Unit: 2315
Serial No.: 08/595,323	)	Examiner: Maung, Z.
Filed: February 1, 1996	)	Batch No. P16
For: Server Group Messaging System for)	
Interactive Applications)	

FORMAL DAWINGS TRANSMITTAL LETTER

Box Issue Fee
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Notice of Drawing Requirements (dated December 6, 1997 (Paper Number 18), enclosed please find the required formal drawings.

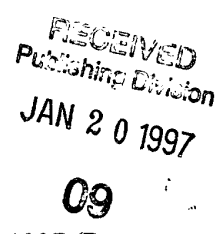
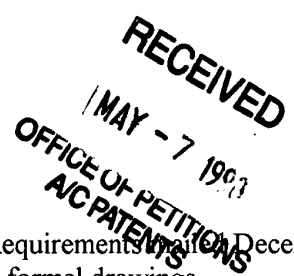
The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 03-1243 (Our Docket No. 16326.701). A duplicate of this paper is enclosed.

Respectfully submitted,

H. C. Chan
H. C. Chan
Registration No. 35,477

Date: January 13, 1998

1072 S. De Anza Blvd. Ste 302
San Jose, CA 95129
Phone: (408) 882-5063





CERTIFICATE OF MAILING UNDER 39 C.F.R. § 118.118 - FIRST CLASS MAIL
I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Box Issue Fee Assistant Commissioner for Patents, Washington, D.C. 20231.


H. C. Chan

Jan 14, 1998
Date

PATENT
Attorney Docket No. 16326.701

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
Daniel Samuel et al.	)	Group Art Unit: 2315
)	
Serial No.: 08/595,323	)	Examiner: Maung, Z.
)	
Filed: February 1, 1996	)	Batch No. P16
)	
For: Server Group Messaging System for)	
Interactive Applications)	

FORMAL DAWINGS TRANSMITTAL LETTER

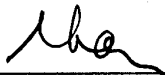
Box Issue Fee
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Notice of Drawing Requirements mailed December 6, 1997 (Paper Number 18), enclosed please find the required formal drawings.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 03-1243 (Our Docket No. 16326.701). A duplicate of this paper is enclosed.

Respectfully submitted,



H. C. Chan
Registration No. 35,477

Date: January 13, 1998

1072 S. De Anza Blvd. Ste 302
San Jose, CA 95129
Phone: (408) 882-5063

APPROVED	O.G. FIG. 7	
BY	CLASS	SUBCLASS
DRAFTSMAN	395	200.17

5822523

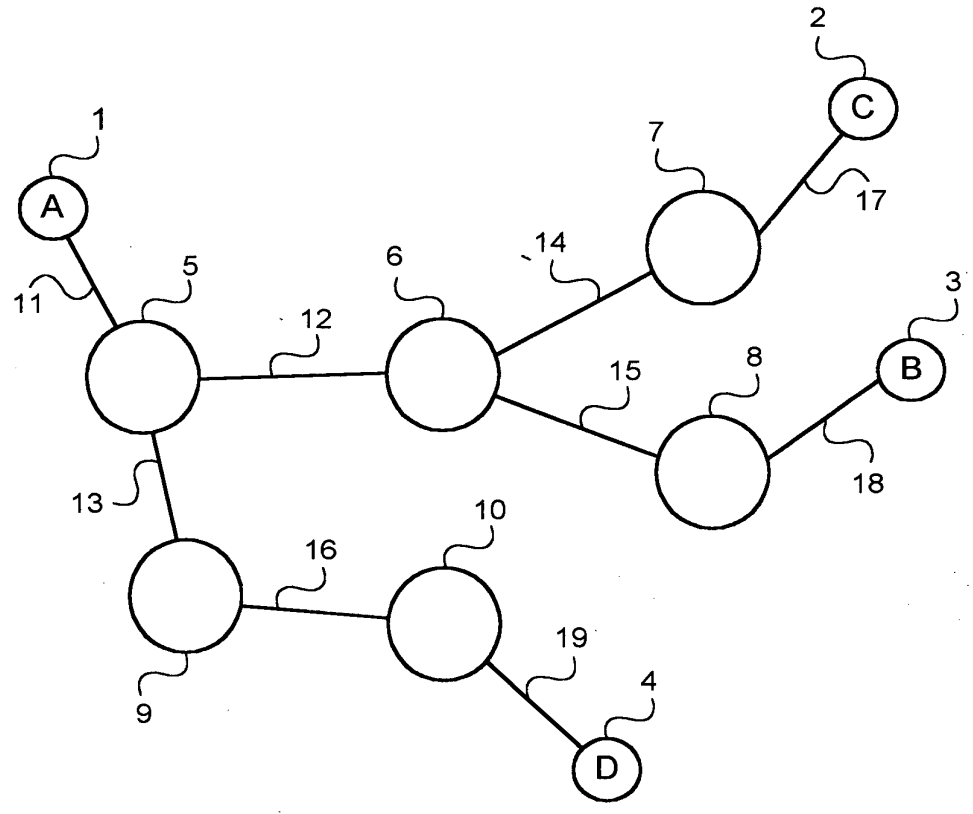


Figure 1
Prior Art

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

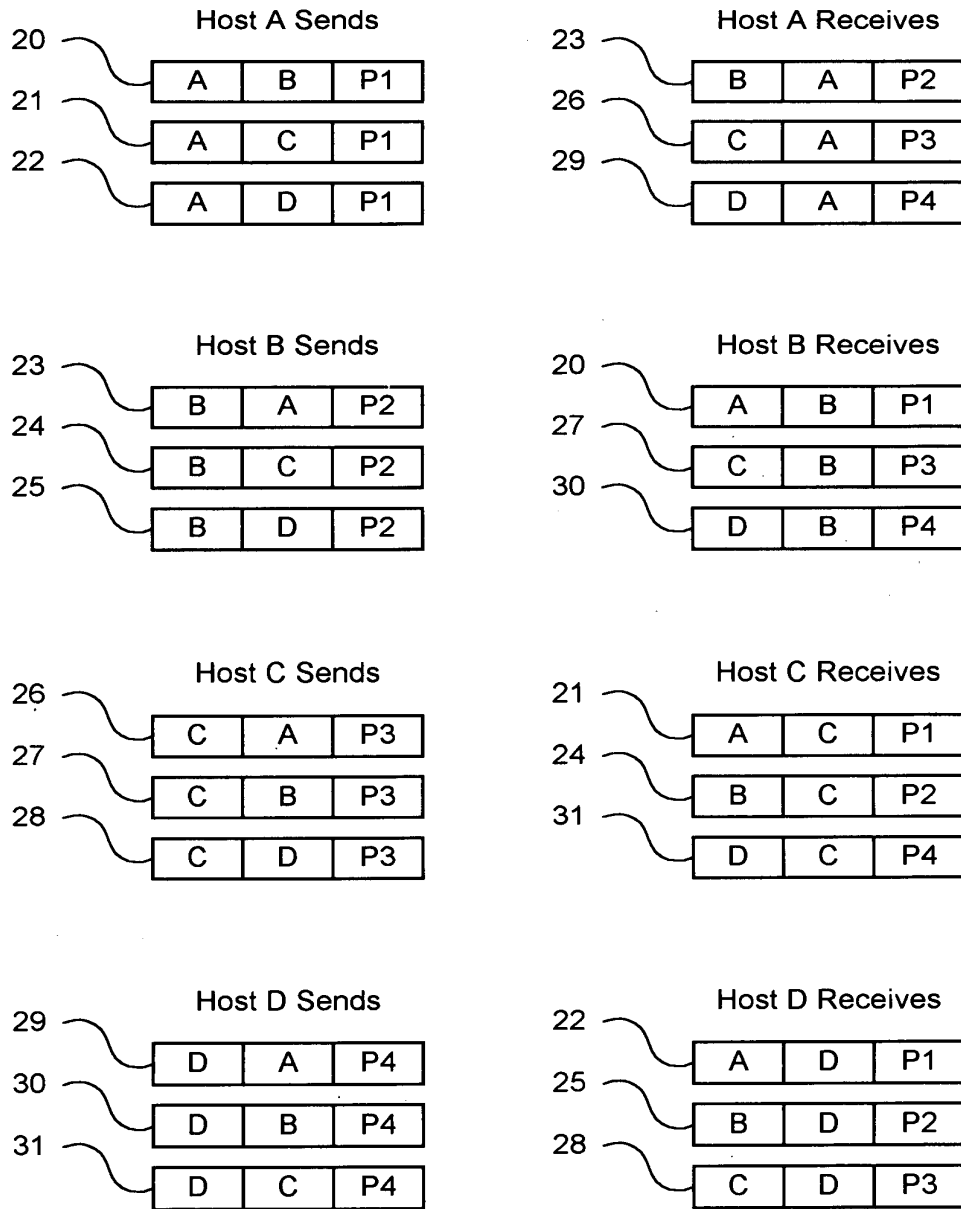


Figure 2
Prior Art

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

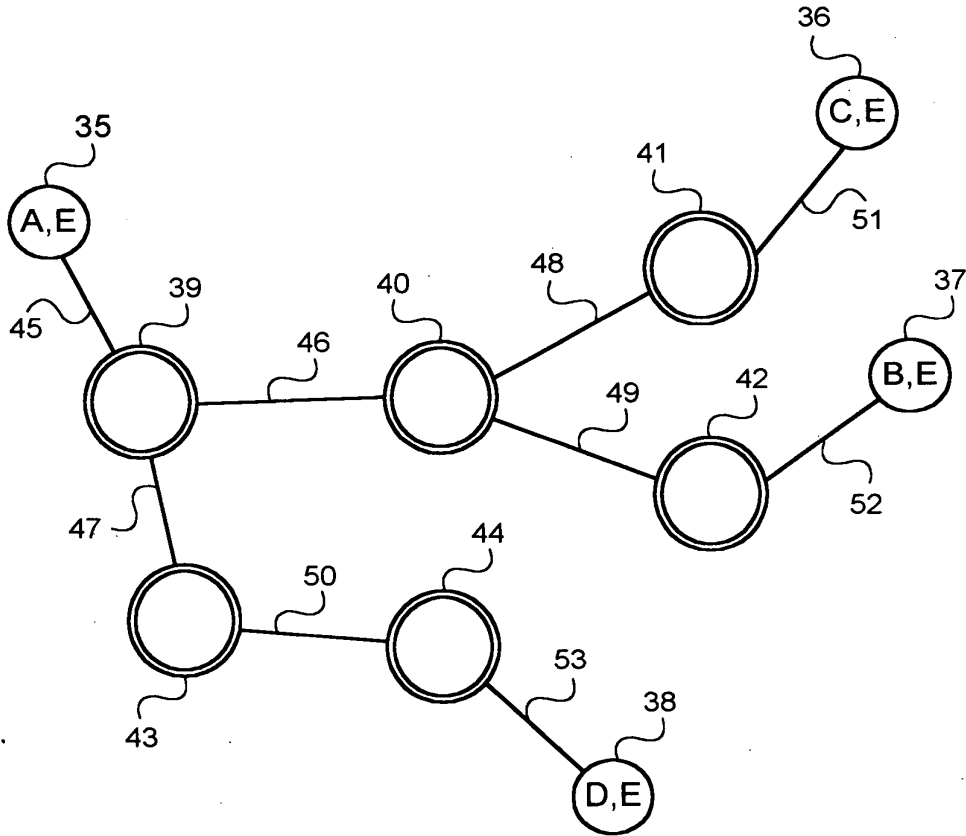


Figure 3
Prior Art

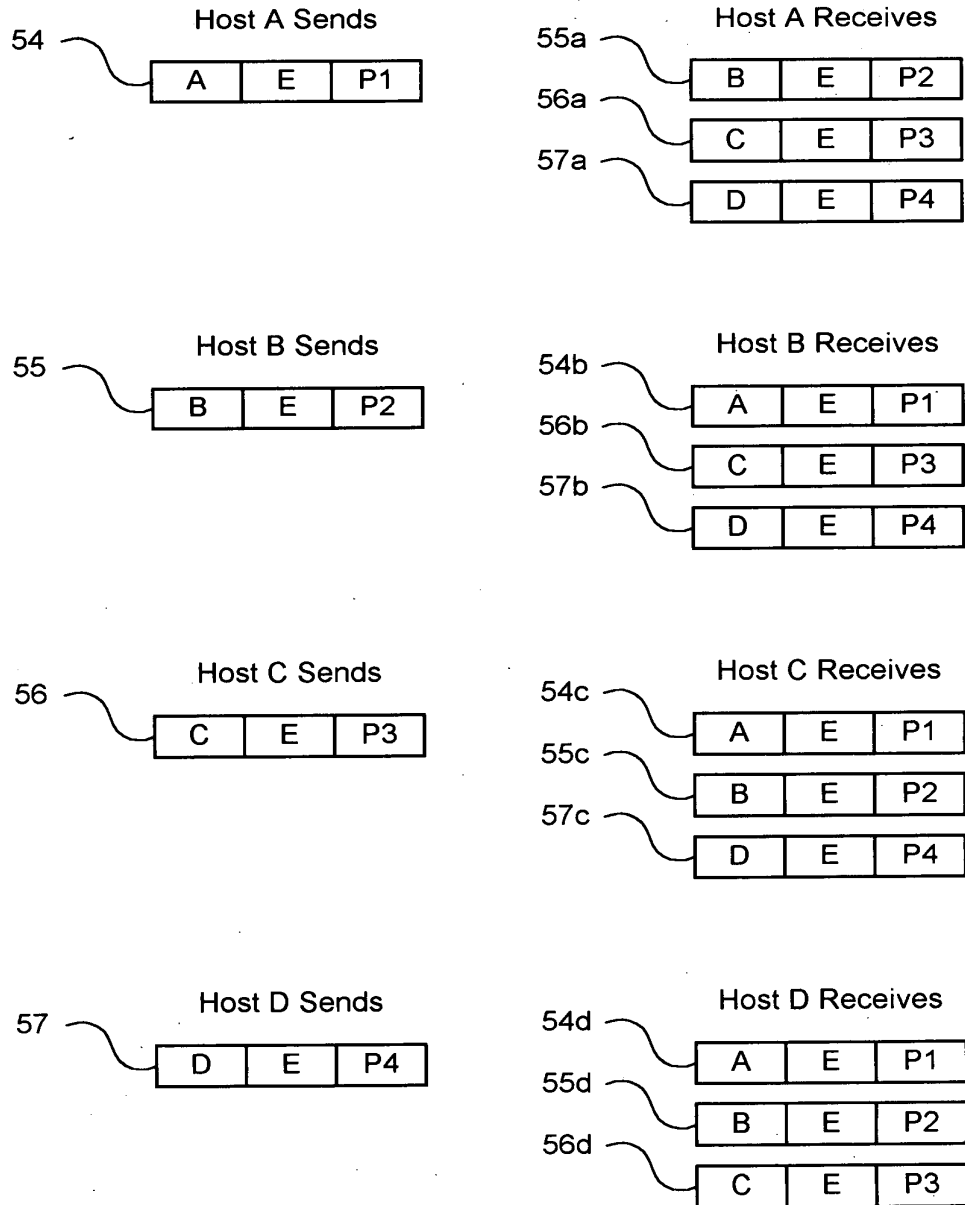


Figure 4
Prior Art

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

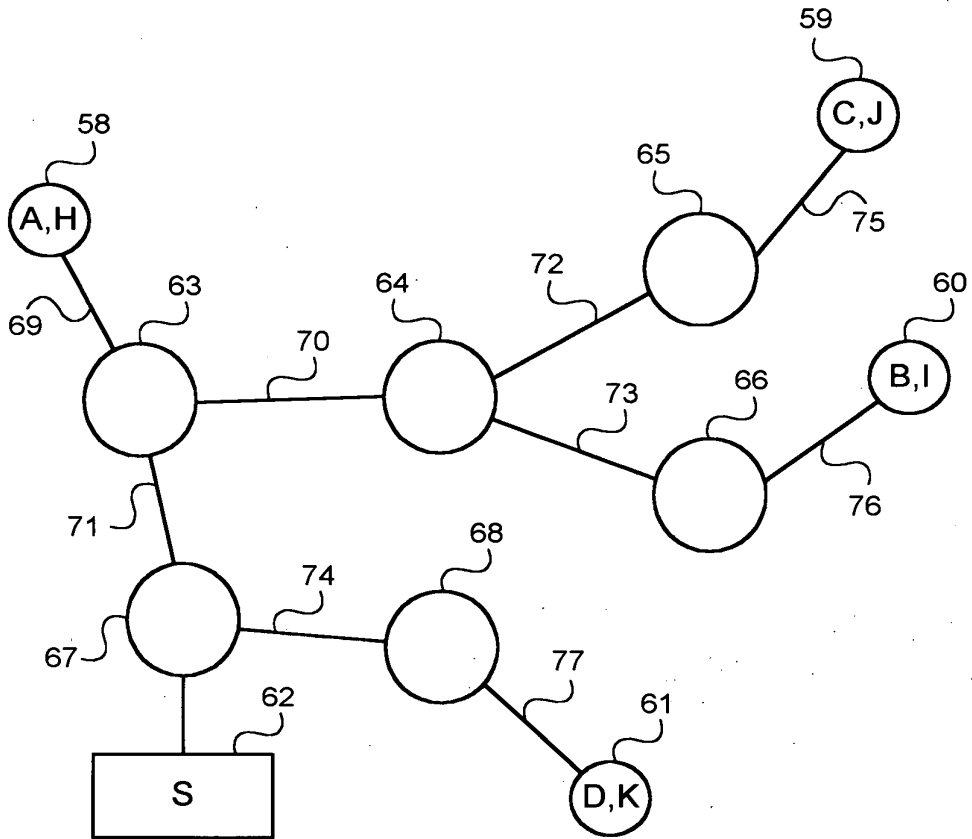


Figure 5

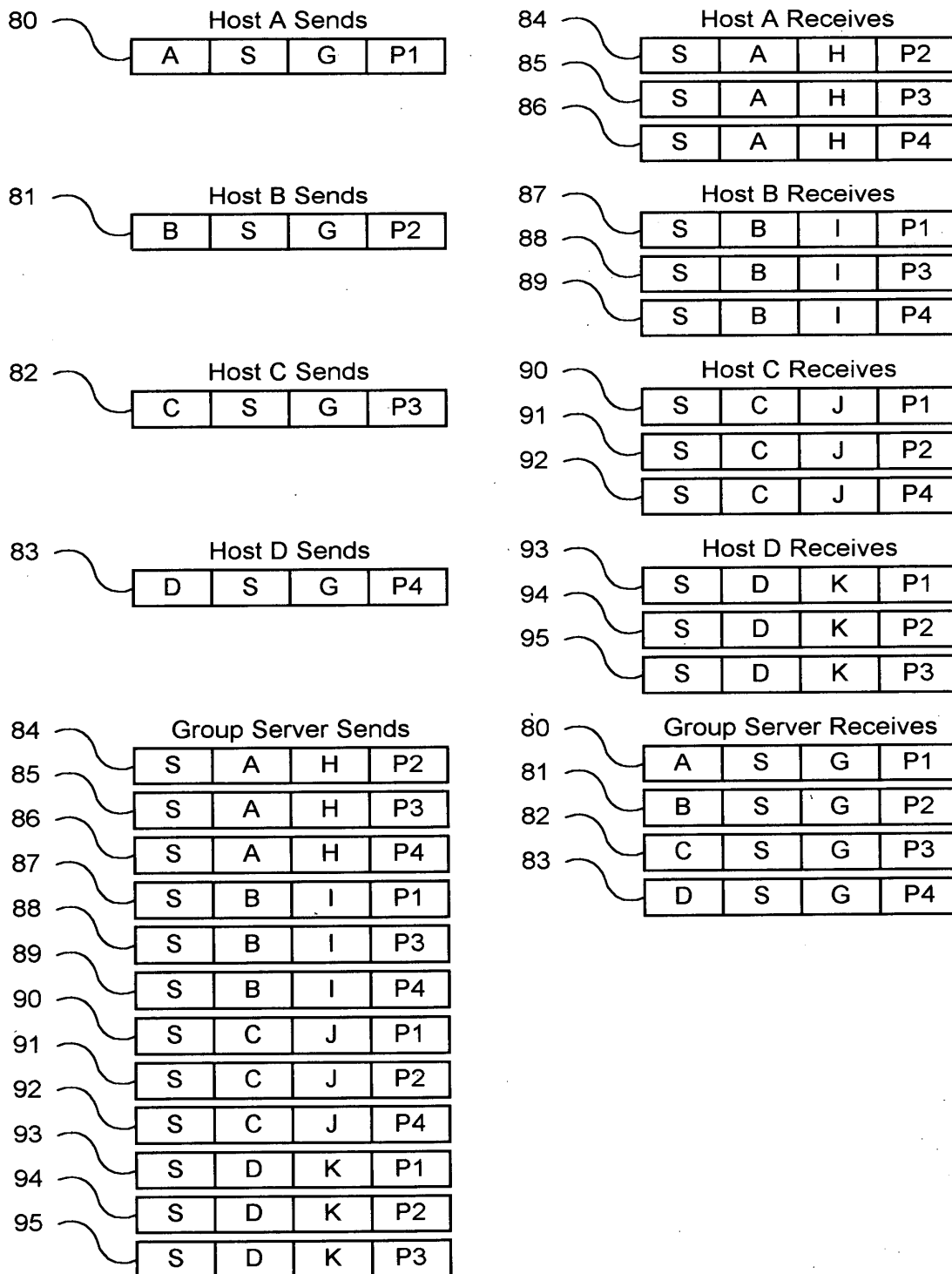


Figure 6

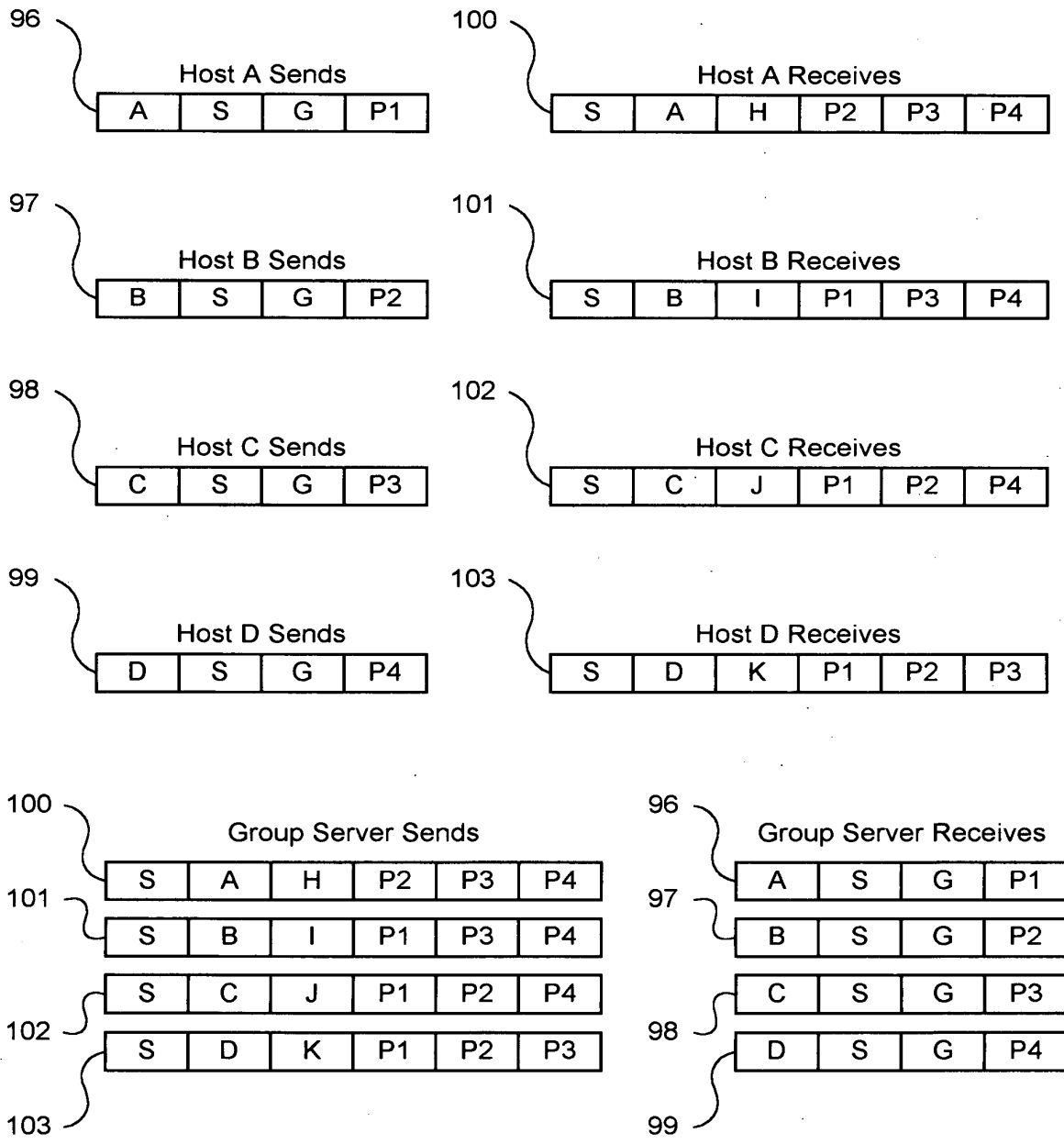


Figure 7

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
CHAPMAN		

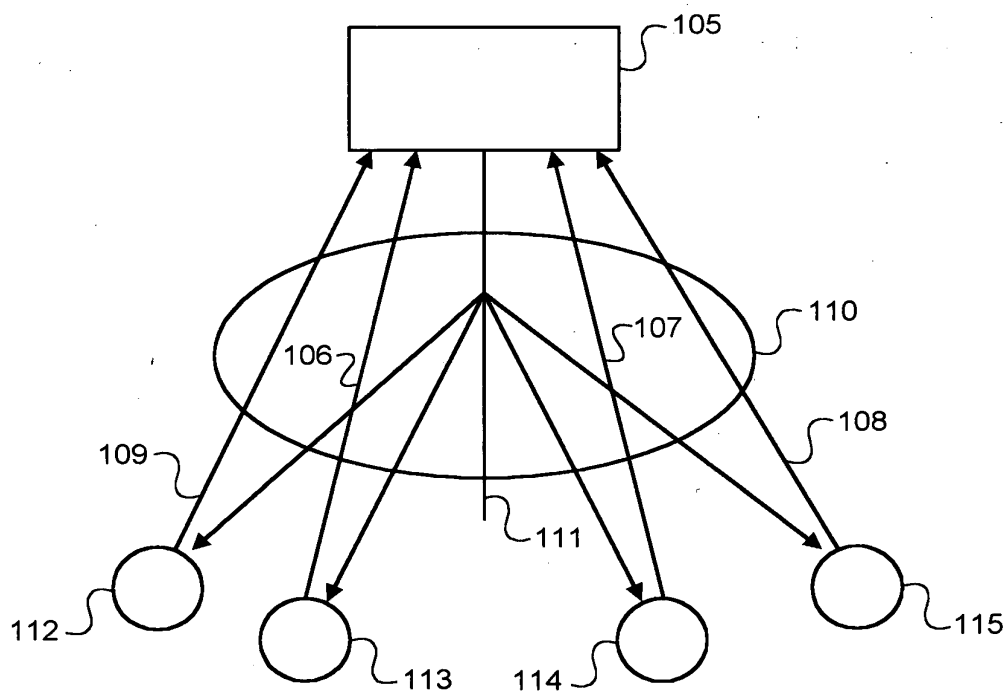


Figure 8
Prior Art

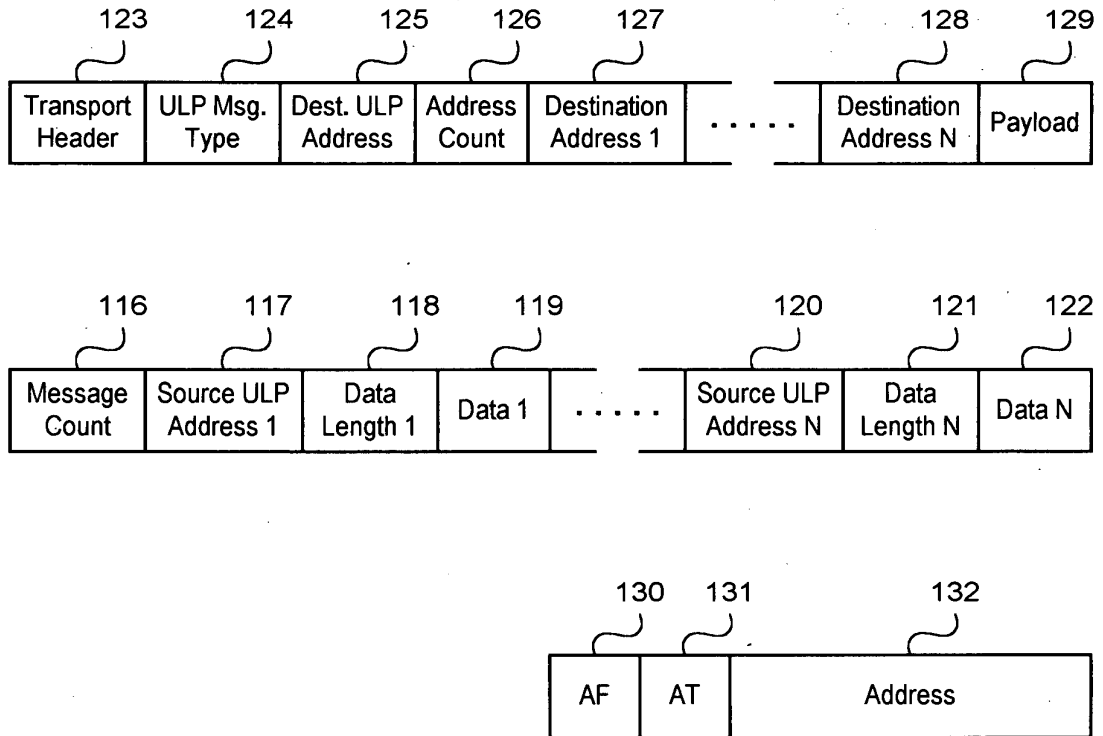


Figure 9

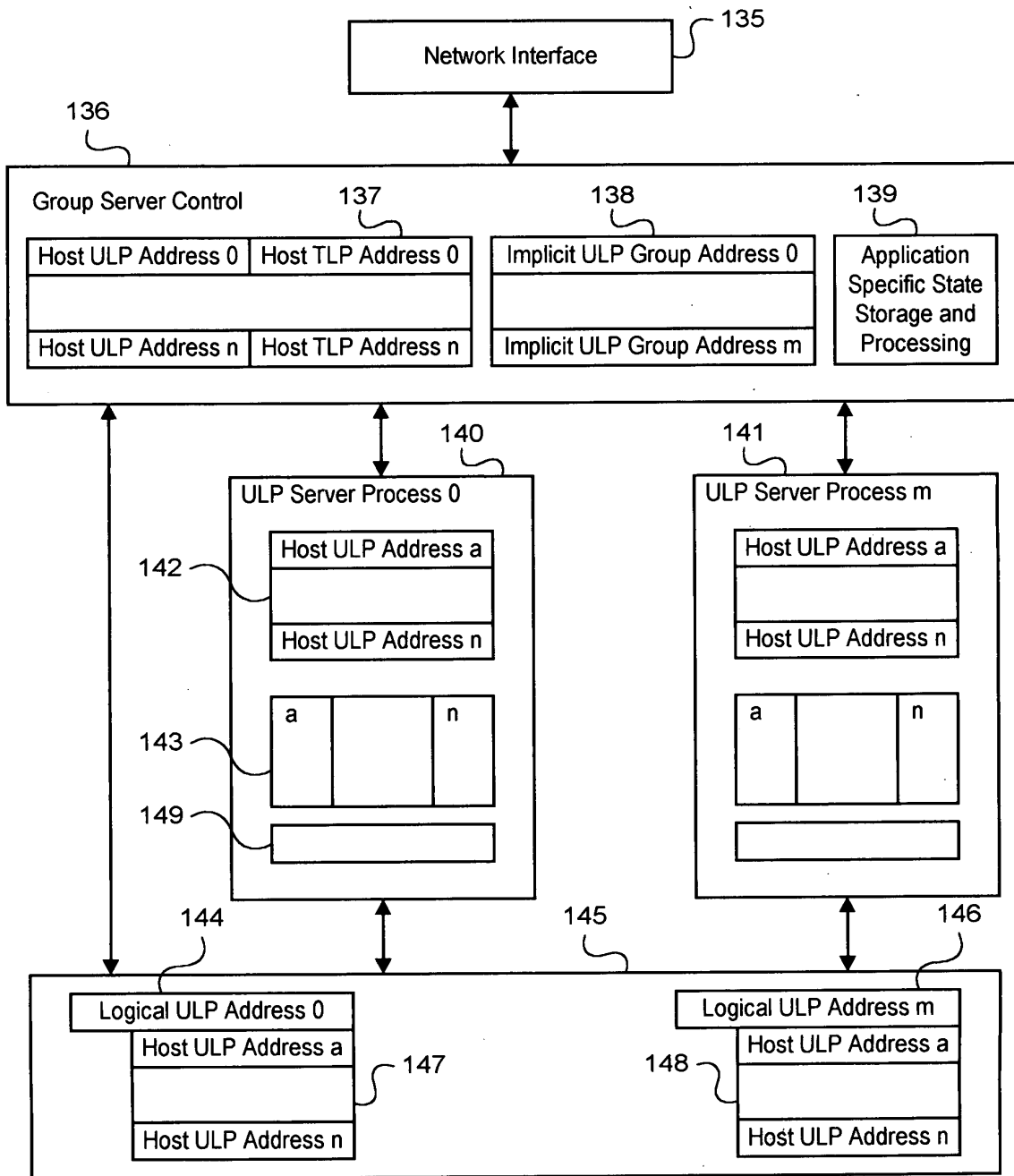


Figure 10

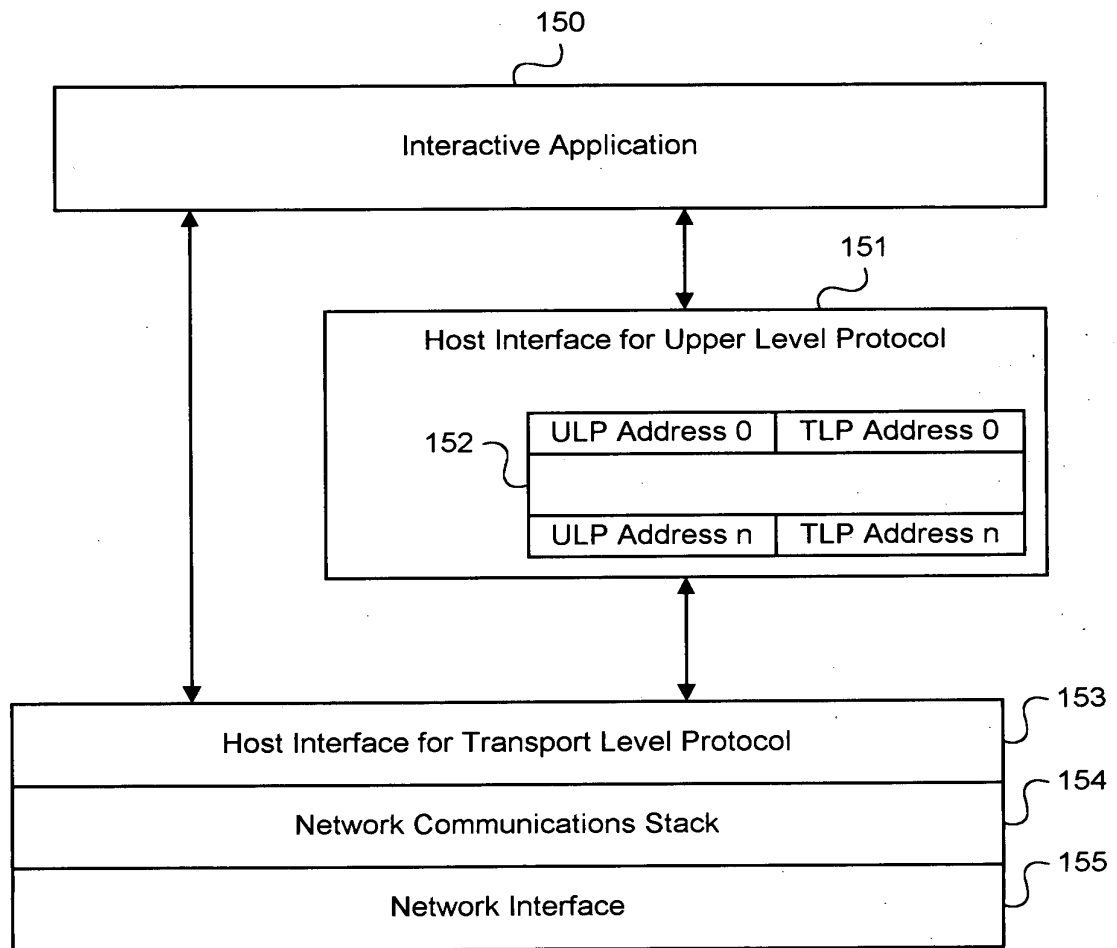
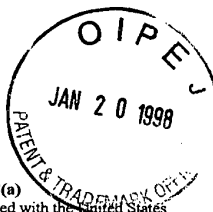
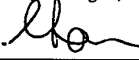


Figure 11



CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States
Postal Service as first class mail in an envelope addressed to: Assistant Commissioner
for Patents, Washington, D.C. 20231.



H. C. Chan

Jan 14, 1998

Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
Daniel Samuel et al.	)	Group Art Unit: 2315
)	
Serial No.: 08/595,323	)	Examiner: Maung, Z.
)	
Filed: February 1, 1996	)	Batch No. P16
)	
For: Server Group Messaging System for)	
Interactive Applications)	

PETITION FOR EXTENSION OF TIME

RECEIVED
Publishing Division
JAN 20 1997

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

09

Applicants submit this Petition for Extension of Time to extend the period for responding to the Notice of Drawing Requirements mailed December 6, 1997, if such an extension is needed.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 03-1243 (Our Docket No. 16326.701). A duplicate of this paper is enclosed.

Respectfully submitted,



Date: January 13, 1998

H. C. Chan
Registration No. 35,477

1072 S. De Anza Blvd. Ste 302
San Jose, CA 95129
Phone: (408) 882-5063



UNITED STATES DEPARTMENT OF COMMERCE
 Patent and Trademark Office
 Address: COMMUNICATIONS CENTER FOR PATENTS AND TRADEMARKS
 Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
--------------------	-------------	-----------------------	---------------------

08/595323 02/01/96 SAMUEL 16326.701

EXAMINER

HAUNG ZARNT
 ART UNIT PAPER NUMBER

2315 11

DATE MAILED: 02/06/98

HC CHAN
 1072 SOUTH DEANZA BLV.
 SUITE 302
 SAN JOSE CA 95129

This is in response to the Power of Attorney filed 11/20/97

- 1. The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record. 37 CFR 1.33.
- 2. The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record. (37 CFR 1.33).
- 3. The withdrawal as attorney in this application has been accepted. Future correspondence will be mailed to the new address of record. 37 CFR 1.33.

This is a communication from the
 Patent and Trademark Office

- 4. The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the below-noted address as provided by 37 CFR 1.33.
- 5. The Power of Attorney in this application is not accepted for the reason(s) checked below:
 - a. The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73 (b) has not been received.
 - b. The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.
 - c. The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.
 - d. The signature of _____, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor.
 - e. The person(s) appointed in the Power of Attorney is not registered to practice before the U.S. Patent & Trademark Office.
 - f. The revocation is not signed by the applicant, the assignee of the entire interest, or one particular principal attorney having the authority to revoke.

HC CHAN
 1072 SOUTH DEANZA BLV.
 SUITE 302.
 SAN JOSE CA 95129

This is a communication from the
 Patent and Trademark Office

RETAIN THIS COPY IN THE APPLICATION FILE COPY A

RAM Fee History
Query
 Revenue Accounting and Management

Name/Number: '08595323'

Total Records Found: 6

Start Date: Any Date

End Date: Any Date

Accounting Date	Sequence Num.	Tran Type	Fee Code	Fee Amount	Mailroom Date	Payment Method
02/21/1996	02600601	<u>1</u>	<u>201</u>	\$375.00	02/01/1996	DA 232415
02/21/1996	02600701	<u>1</u>	<u>581</u>	\$40.00	02/01/1996	DA 232415
07/03/1996	00401401	<u>3</u>	<u>581</u>	\$40.00	07/02/1996	DA 232415
08/11/1997	00000149	<u>1</u>	<u>122</u>	\$130.00	07/22/1997	DA 232415
11/10/1997	00000207	<u>1</u>	<u>242</u>	\$645.00	09/22/1997	OP
11/10/1997	00000208	<u>1</u>	<u>561</u>	\$30.00	09/22/1997	DA 031243

Num	Type	Date	Code	Contents Description
21	I	07/22/97	PET.	PETITION ENTERED
20	I	03/03/98	DGU2	DDRAWINGS RECEIVED IN DPD, 2=DRAWING SET NUMBER.
19	I	01/20/98	DGR2	MMAIL ROOM DATE OF DRAWING, 2=DRAWING SET NUMBER.
18	O	02/06/98	N570	COMMUNICATION RE POWER OF ATTORNEY (PTOL-308, 46-90) P/E
17	I	11/20/97	PA..	CHANGE IN POWER OF ATTORNEY (MAY INCLUDE CORR. CHANGE) (MAY INCLUDE ASSOC. POWER) P/E
16	O	12/05/97	DGP1	DDRAWINGS PROCESS COMPLETED FOR DRAWING SET NUMBER 1.
15	I	11/14/97	DGM1	DDRAWINGS MATCHED TO APPLICATION, 1=DRAWING SET NUMBER.
14	I	11/03/97	DGU1	DDRAWINGS RECEIVED IN DPD, 1=DRAWING SET NUMBER
13	I	10/07/97	DGR1	MMAIL ROOM DATE OF DRAWING, 1=DRAWING SET NUMBER.
12	N	07/09/97	N/=.	NOTICE OF ALLOWANCE PRINT
11	A	07/07/97	CNTA	COUNT DATE-NOTICE OF ALLOWANCE; IF TYPE F-1ST ACTION; IF TYPE M-2ND/PLUS ACTION FAOM; IF TYPE A-ALL OTHER ACTIONS
10	E	06/27/97	FWDX	DATE FORWARDED TO EXAMINER
9	I	06/09/97	A...	RESPONSE AFTER NON-FINAL ACTION
8	O	03/20/97	MAIL	MAIL DATE OF OFFICE ACTION
7	F	03/17/97	CTNF	COUNT DATE-NON-FINAL ACTION; IF TYPE F-1ST ACTION; IF TYPE M-2ND/PLUS ACTION FAOM; IF TYPE O-ALL OTHER ACTIONS
6	I	11/19/96	M844	PRIOR ART CITATION FILED P/E
5	D	07/02/96	DOCK	DATE CASE WAS DOCKETED
4	E	06/12/96	TR.Q	TRANSFER INQUIRY
3	E	06/11/96	TR.Q	TRANSFER INQUIRY
2	I	04/09/96	FILM	MICROFILM RECORD CAPTURED OF APPLICATION
1	E	02/16/96	IE04	INITIAL EXAM TEAM 4



UNITED STATES DEPARTMENT OF COMMERCE
 Patent and Trademark Office
 ASSISTANT SECRETARY AND COMMISSIONER OF
 PATENTS AND TRADEMARKS
 Washington, D.C. 20231
 FMH.5

Paper No. 13

H C CHAN
 1072 SOUTH DE ANZA BOULEVARD
 SUITE 302
 SAN JOSE, CA 95129

COPY MAILED

MAY 27 1998

**SPECIAL PROGRAMS OFFICE
 DAC FOR PATENTS**

In re Application of
 DANIEL J. SAMUEL ET AL
 Application No. 08/595,323
 Filed: February 1, 1996
 Attorney Docket No. 16326.701

:
:
:
:
:
:

ON PETITION

This is a decision on the petition under 37 CFR 1.182, filed July 22, 1997, to change the order of the names of the inventors.

The petition is granted.

This application is being forwarded to Drafting Branch within Publishing Division via the Initial Patent Examination Division, Customer Corrections, to change the order of inventorship.

Telephone inquiries concerning this matter may be directed to the undersigned at (703) 305-8680.

Frances Hicks
 Petitions Examiner
 Office of Petitions
 Office of the Deputy Assistant Commissioner
 for Patent Policy and Projects



**UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/595,323	02/01/96	SAMUEL	D 16326.701

LM21/0723

HC CHAN
1072 SOUTH DEANZA BLVD
SUITE 302
SAN JOSE CA 95129

EXAMINER	
MAUNG, Z	
ART UNIT	PAPER NUMBER
2784	16

DATE MAILED: 07/23/98

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents

SEE ATTACHED .

Serial Number: 08/595,323

Art Unit : 2758

This communication is responsive to the Interview Summary filed on August 25, 1997. The Interview Summary refers to the interview that was held on July 3, 1997. The Interview Summary has been received and placed in the file, and no further response by the examiner is deemed necessary. The application has been forwarded to the issue branch.


Zami Maung
Patent Examiner

#18
KW
11-23-98

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Rothschild *et al.*

Appl. No. 08/595,323

Filed: February 1, 1996

For: **Server-Group Messaging System
for Interactive Applications**

Art Unit: 2315

Examiner: Maung, Z.

Atty. Docket: 1719.0050000

Box Issue Fee



Revocation of Prior Power of Attorney and Appointment of New Attorneys of Record

RECEIVED
98 AUG - 7 AM 8: 07
GROUP 2700

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

The undersigned, having express authority to represent **Mpath Interactive, Inc.**, the assignee of the entire right, title, and interest in the above-captioned application, by assignment filed at the U.S. Patent and Trademark Office on **02/01/1996** and recorded at **reel 7861, frame 0413**, (copy enclosed), hereby revokes all powers of attorney heretofore given in the above-captioned application and appoints as his attorneys Robert Greene Sterne, Registration No. 28,912; Edward J. Kessler, Registration No. 25,688; Jorge A. Goldstein, Registration No. 29,021; Samuel L. Fox, Registration No. 30,353; David K.S. Cornwell, Registration No. 31,944; Robert W. Esmond, Registration No. 32,893; Tracy-Gene G. Durkin, Registration No. 32,831; Michele A. Cimbala, Registration No. 33,851; Michael B. Ray, Registration No. 33,997; Robert E. Sokohl, Registration No. 36,013; and Eric K. Steffe, Registration No. 36,688, with full power of substitution, association, and revocation, to prosecute said application and to transact all business in the United States Patent and Trademark Office connected therewith.

The undersigned hereby grants said attorneys the power to insert on this Power of Attorney any further identification that may be necessary or desirable in order to comply with the rules of the U.S. Patent and Trademark Office.

Send all correspondence to:

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934.

Direct telephone calls to (202) 371-2600.

FOR: Mpath Interactive, Inc.

SIGNATURE: Brian A. Apgar

BY: Brian Apgar

TITLE: Executive Vice President of Development

DATE: 7/24/98



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

JUNE 17, 1996

PTAS
WILSON, SONSINI, GOODRICH & ROSATI
H. C. CHAN
650 PAGE MILL ROAD
PALO ALTO, CA 94304-1050



100164640A

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, NORTH TOWER BUILDING, SUITE 10C35, WASHINGTON, D.C. 20231.

RECORDATION DATE: 02/01/1996

REEL/FRAME: 7861/0413
NUMBER OF PAGES: 4

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

SAMUEL, DANIEL JOSEPH

DOC DATE: 01/30/1996

ASSIGNOR:

KWIATKOWSKI, MARC PETER

DOC DATE: 01/30/1996

ASSIGNOR:

ROTHSCHILD, JEFFREY JACKIEL

DOC DATE: 01/30/1996

ASSIGNEE:

MPATH INTERACTIVE, INC.
10455-A BANDLEY DRIVE
CUPERTINO, CALIFORNIA 95014

SERIAL NUMBER: 08595323

PATENT NUMBER:

FILING DATE: 02/01/1996

ISSUE DATE:

7861/0413 PAGE 2

TONYA LEE, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
 ASSISTANT SECRETARY AND COMMISSIONER
 OF PATENTS AND TRADEMARKS
 Washington, D.C. 20231



100164640B

AUTHORIZATION TO CHARGE ADDITIONAL FEES TO DEPOSIT ACCOUNT

JUNE 17, 1996

TO: OFFICE OF FINANCE
FROM: ASSIGNMENT DIVISION
 OFFICE OF PUBLIC RECORDS
SUBJECT: DEPOSIT ACCOUNT CHARGE(S)

CHARGE THE DEPOSIT ACCOUNT LISTED BELOW ADDITIONAL FEE(S) AS INDICATED BELOW. AUTHORIZATION TO CHARGE ADDITIONAL FEES HAS BEEN PROVIDED PER THE ATTACHED COVER SHEET, OR BY DIRECT CONTACT WITH THE CUSTOMER.

DEPOSIT ACCOUNT NUMBER: 23-2415
 PROPERTY NUMBER: 08595323

RECORDING FEES:

FEE CODE: 581 AMOUNT: 40

IF YOU HAVE ANY QUESTIONS REGARDING THIS NOTICE, YOU MAY CONTACT THE INDIVIDUAL WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723.

TONYA LEE, EXAMINER
 ASSIGNMENT DIVISION
 OFFICE OF PUBLIC RECORDS

TRADEMARK SERVICE FEES:	FEE CODE:
RECORDING FIRST MARK	481
RECORDATION SECOND AND SUBSEQUENT MARK IN SAME DOCUMENT	482
LABOR CHARGES FOR SERVICES PER HOURS OR FRACTION THEREOF	484
UNSPECIFIED OTHER SERVICES	485

PATENT SERVICE FEES:

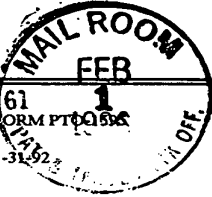
RECORDING EACH PATENT ASSIGNMENT, 581

RECEIVED
 98 AUG - 7 AM 8: 07
 GROUP 2700

AGREEMENT, OTHER PAPER, PER PROPERTY	
LABOR CHARGES FOR SERVICES PER HOUR	584
(\$30) OR FRACTION THEREOF	
UNSPECIFIED OTHER SERVICES	585

MRd 2-1-96

08/595323



04-03-1996

RE



100164640

EET

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

To the Honorable Commissioner of Patents and Trademarks: Please record the attached original documents or copy thereof.

1. Name of conveying party(ies): Daniel Joseph Samuel,
Marc Peter Kwiatkowski and Jeffrey Jackiel Rothschild

2. Name and address of receiving party(ies):
Name: Mpath Interactive, Inc.
Internal Address:

Street Address: 10455-A Bandlely Drive

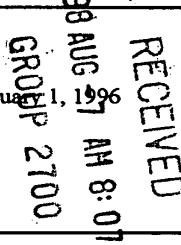
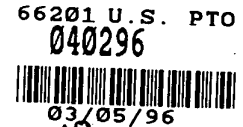
City: Cupertino State: CA Zip: 95014

Additional name(s) of conveying party(ies) attached? Yes No

3. Nature of conveyance:
 Assignment Merger
 Security Agreement Change of Name
 Other

Additional name(s) & address(es) attached? Yes No

Execution Date: January 30, 1996



4. Application number(s) or patent number(s):

If this document is being filed together with a new application, the execution date of the application is: February 1, 1996

A. Patent Application No.(s):

B. Patent No.(s)

Additional numbers attached? Yes No

5. Name and address of party to whom correspondence concerning document should be mailed:
Name: H. C. Chan
Internal Address: FH 1-2
Wilson, Sonsini, Goodrich & Rosati
Street Address:
650 Page Mill Road
City: Palo Alto State: CA Zip: 94304-1050

6. Total number of applications and patents involved: [1]

7. Total fee (37 CFR 3.41) \$40.00
 Enclosed
 Authorized to be charged to deposit account

8. Deposit account number: 23-2415
(Our Attorney Docket No. 16326.701)
(Attach duplicate copy of this page if paying by deposit account)

DO NOT USE THIS SPACE

9. Statement and signature.
To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

H. C. Chan

Signature

Date

2/1/96

Total number of pages comprising cover sheet: [1]

ASSIGNMENT

WHEREAS, the undersigned,

Daniel Joseph Samuel
1248 Van Dyck Drive
Sunnyvale, CA 94087

Marc Peter Kwiatkowski
347 Massol Avenue, #108
Los Gatos, CA 95030-7234

and

Jeffrey Jackiel Rothschild
15560 Old Ranch Road
Los Gatos, CA 95030

hereinafter termed "Inventors", have invented certain new and useful improvements in

SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS

as filed herewith; and

WHEREAS, Mpath Interactive Inc., a corporation of the State of California, having a place of business at 10455-A Bandy Drive, Cupertino, California, (hereinafter termed "Assignee"), is desirous of acquiring the entire right, title and interest in and to said application and the invention disclosed therein, and in and to all embodiments of the invention, heretofore conceived, made or discovered jointly or severally by said Inventors (all collectively hereinafter termed "said invention"), and in and to any and all patents, inventor's certificates and other forms of protection (hereinafter termed "patents") thereon granted in the United States and foreign countries.

NOW, THEREFORE, in consideration of good and valuable consideration acknowledged by said Inventors to have been received in full from said Assignee:

1. Said Inventors do hereby sell, assign, transfer and convey unto said Assignee the entire right, title and interest (a) in and to said application and said invention; (b) in and to all rights to apply for foreign patents on said invention pursuant to the International Convention for the Protection of Industrial Property or otherwise; (c) in and to any and all applications filed and any and all patents granted on said invention in the United States or any foreign country, including each and every application filed and each and every patent granted on any application which is a divisional, substitution, continuation, or continuation-in-part of any of said applications; and (d) in and to each and every reissue or extensions of any of said patents.

2. Said Inventors hereby jointly and severally covenant and agree to cooperate with said Assignee to enable said Assignee to enjoy to the fullest extent the right, title and interest herein conveyed in the United States and foreign countries. Such cooperation by said Inventors shall include prompt production of pertinent facts and documents, giving of testimony, execution of petitions, oaths, specifications, declarations or other papers, and other assistance all to the extent deemed necessary or desirable by said Assignee (a) for perfecting in said Assignee the right, title and interest herein conveyed; (b) for prosecuting any of said applications; (c) for filing and prosecuting substitute, divisional, continuing or additional applications covering said invention; (d) for filing and prosecuting applications for reissuance of any said patents; (e) for interference or other priority proceedings involving said invention; and (f) for legal proceedings involving said invention and any applications therefor and any patents granted thereon, including without limitation reissues and reexaminations, opposition proceedings, cancellation proceedings, priority contests, public use proceedings, infringement actions and court actions; provided, however, that the expense incurred by said Inventors in providing such cooperation shall be paid for by said Assignee.

3. The terms and covenants of this assignment shall inure to the benefit of said Assignee, its successors, assigns and other legal representatives, and shall be binding upon said Inventors, their respective heirs, legal representatives and assigns.

4. Said Inventors hereby jointly and severally warrant and represent that they have not entered and will not enter into any assignment, contract, or understanding in conflict herewith.

IN WITNESS WHEREOF, the said Inventors have executed and delivered this instrument to said Assignee as of the dates written below.

State of California)
County of Santa Clara)

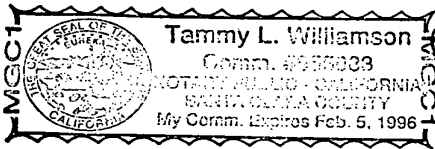
On 1-30, 1996, before me, TAMMY L. WILLIAMSON,
personally appeared Daniel Joseph Samuel,

personally known to me or proved to me on the basis of satisfactory evidence, to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person or the entity upon behalf of which the person acted, executed the instrument.

Daniel Joseph Samuel
Daniel Joseph Samuel

1/30/96
Date

WITNESS my hand and official seal.



Tammy L. Williamson
(Notary Public)

[Handwritten Signature]

Marc Peter Kwiatkowski

1/30/96
Date



State of California)
County of Santa Clara

On 1-30, 1996, before me, Tammy L. Williamson
personally appeared Marc Peter Kwiatkowski,

personally known to me or proved to me on the basis of satisfactory evidence, to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

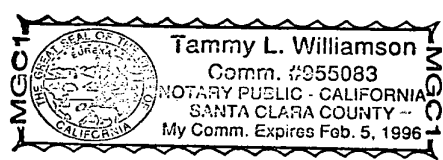
[Handwritten Signature]

(Notary Public)

[Handwritten Signature]

Jeffrey Jackiel Rothschild

1/30/96
Date



State of California)
County of Santa Clara

On 1-30, 1996, before me, Tammy L. Williamson
personally appeared Jeffrey Jackiel Rothschild,

personally known to me or proved to me on the basis of satisfactory evidence, to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

[Handwritten Signature]

(Notary Public)

Certificate Under 37 C.F.R. § 3.73(b)

Applicant(s): Rothschild et al.

Application No: 08/595,323 Filed: February 1, 1996

For: Server-Group Messaging System for Interactive Applications

Mpath Interactive, a Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

certifies that it is an assignee of the patent application identified above by virtue of either:

A. An Assignment from the inventor(s) of the patent application identified above. The assignment was recorded in the Patent and Trademark Office at Reel 7861, Frame 0413, or for which a copy thereof is attached.

[or]

B. A chain of title from the inventor(s) of the patent application identified above to the current assignee as shown below:

1. From: _____ To: _____
The document was recorded in the Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____
The document was recorded in the Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____
The document was recorded in the Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet.

Copies of assignments or other documents in the chain of title are attached.

The undersigned (whose title is supplied below) is empowered to act on behalf of the assignee.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both under Section 1001, Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 7/24/98

Name: Brian Apgar

Title: Executive Vice President of Development

Signature: Brian A. Apgar

PAUSERS\SCULLER\17190050000cert.wpd
SKGF Rev.1/26/98 dww

2315

2784

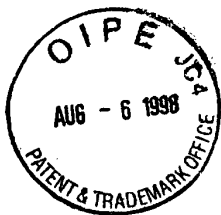
STERNE, KESSLER, GOLDSTEIN & FOX P.E.L.C.*

ATTORNEYS AT LAW
SUITE 600

1100 NEW YORK AVENUE, N.W.
WASHINGTON, D.C. 20005-3934

(202) 371-2600

FACSIMILE: (202) 371-2540; (202) 371-6566



ROBERT GREENE STERNE
EDWARD J. KESSLER
JORGE A. GOLDSTEIN
SAMUEL L. FOX
DAVID K.S. CORNWELL
ROBERT W. ESMOND
TRACY-GENE G. DURKIN
MICHELE A. CIMBALA
MICHAEL B. RAY
ROBERT E. SOKOHL
ERIC K. STEFFE
MICHAEL O. LEE

JOHN M. COVERT*
LINDA E. ALCORN
RAZ E. FLESHNER
ROBERT C. MILLONIG
STEVEN R. LUDWIG
MICHAEL V. MESSINGER
JUDITH U. KIM
KEITH KIND
TIMOTHY J. SHEA, JR.
DONALD R. MCPHAIL
PATRICK E. GARRETT
BARBARA A. PARVIS
MICHAEL A. RAHMAN*

STEPHEN G. WHITESIDE*
NOEL B. WHITLEY*
JEFFREY T. HELVEY*
RICHARD A. DUNNING, JR.
KIMBERLIN L. MORLEY
RALPH P. ALBRECHT
HEIDI L. KRAUS*
JEFFREY R. KURIN*
CARL B. MASSEY, JR.*
RAYMOND MILLIEN*
PATRICK D. O'BRIEN*
BRIAN S. ROSENBLUM*

DONALD J. FEATHERSTONE**
LAWRENCE B. BUGAISKY**
KAREN R. MARKOWICZ**
GRANT E. REED**
VICTOR E. JOHNSON**
SERGE SIRA**

*BAR OTHER THAN D.C.
**REGISTERED PATENT AGENTS

WRITER'S DIRECT NUMBER:

INTERNET ADDRESS: (202) 371-2667

August 6, 1998

mikem@skgf.com

Attention: Box Issue Fee
Batch No.: P16

Assistant Commissioner for Patents
Washington, D.C. 20231

Re: U.S. Patent Application
Appl. No. 08/595,323; Filed: February 1, 1996
For: **Server-Group Messaging System for Interactive Applications**
Inventors: Rothschild *et al.*
Our Ref: 16326.701

RECEIVED
98 AUG -7 AM 8: 07
GROUP 2750

Sir:

Transmitted herewith for appropriate action are the following documents:

1. Revocation of Prior Power of Attorney and Appointment of New Attorneys of Record executed by Brian Apgar;
2. Copy of recorded Assignment document;
3. Certificate Under 37 C.F.R. § 3.73(b) executed by Brian Apgar; and
4. One (1) return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our courier. In the event that extensions of time are necessary to prevent abandonment of this patent application, then such extensions of time are hereby petitioned.

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Assistant Commissioner for Patents
August 6, 1998
Page 2

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036. A duplicate copy of this letter is enclosed.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

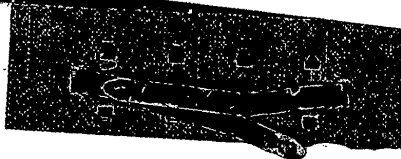


Michael V. Messinger
Attorney for Applicants
Registration No. 37,575

MVM:jmh
Enclosures

P:\USERS\JHALL\1719(Mpath)\005 PTO COVER.Revocation papers
SKGF Rev. 1/25/98 dcw

10-13-98



PTO UTILITY GRANT
Paper Number 17

The Commissioner of Patents
and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to an statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

Bence Lehman
Commissioner of Patents and Trademarks

Attest *Mary A. G.*

The
United
States
of
America



Form PTO-1304 (Rev. 2/97)



UNITED STATES DEPARTMENT OF COMMERCE
 Patent and Trademark Office
 Address: COMMISSIONER OF PATENTS AND TRADEMARKS
 Washington, D.C. 20231

SERIAL NUMBER	FLING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/595323	02/01/96	SAMUEL	16326.701

EXAMINER

MALING, ZARNI

ART UNIT	PAPER NUMBER
2784	19

2784

DATE MAILED: 11/23/98

HC CHAN
 1072 SOUTH DEANZA BLVD
 SUITE 302
 SAN JOSE CA 95129

This is in response to the Power of Attorney filed 08/06/98

- 1. The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record. 37 CFR 1.33.
- 2. The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record. (37 CFR 1.33).
- 3. The withdrawal as attorney in this application has been accepted. Future correspondence will be mailed to the new address of record. 37 CFR 1.33.

Kim Blatton 703.306.4139
 This is a communication from the
 Patent and Trademark Office

- 4. The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the below-noted address as provided by 37 CFR 1.33.
- 5. The Power of Attorney in this application is not accepted for the reason(s) checked below:
 - a. The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73 (b) has not been received.
 - b. The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.
 - c. The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.
 - d. The signature of _____, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor.
 - e. The person(s) appointed in the Power of Attorney is not registered to practice before the U. S. Patent & Trademark Office.
 - f. The revocation is not signed by the applicant, the assignee of the entire interest, or one particular principal attorney having the authority to revoke.

STERNE KESSLER GOLDSTEIN & FOX PLLC
 1100 NEW YORK AVENUE - NW
 SUITE 600
 WASHINGTON DC 20005-3934

Kim Blatton
 This is a communication from the
 Patent and Trademark Office

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Rothschild <i>et al.</i>	Patent No. :	5,822,523
Serial No. :	08/595,323	Issue Date :	October 13, 1998
Filed :	February 1, 1999		
Title :	Server-Group Messaging System for Interactive Applications		



REVOCATION AND POWER OF ATTORNEY

Assistant Commissioner for Patents
Washington, D.C. 20231

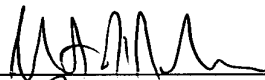
Sir:

As an officer of Paltalk Holdings, Inc., owner of the entire right, title and interest in, to and under the invention described and claimed in the above-identified patent, I hereby revoke all previous powers of attorney and appoint the following attorneys, with full power of substitution and revocation, to transact all business in the Patent and Trademark Office connected therewith Daniel A. Devito (32,125), Edward V. Filardi (25,757), David W. Hansen (38,910), Constance S. Huttner (35,903), Ronald S. Laurie (25,431), Robert B. Smith (28,538), Robert B. Beyers (46,552), Meir Y. Blonder (40,517), Ian R. Blum (42,336), John L. Dauer, Jr. (39,953), Jose Esteves (41,011), Michael D. Fabiano (44,675), Stacey J. Farmer (42,526), Di Jiang-Schuerger (44,806), Frederick D. Kim (38,513), Thomas R. Lane (42,718), Daniel J. Lin (47,750), Douglas R. Nemecek (41,219), Guy Perry (46,194), Constance F. Ramos (47,883), Andrew F. Strobert (35,375), Todd J. Tiberi (37,455), Joseph Yang (41,387), and Matthew B. Zisk (45,257), all of Skadden, Arps, Slate, Meagher & Flom LLP, whose address is Four Times Square, New York, NY 10036.

Please direct all future correspondence to Skadden, Arps, Slate, Meagher & Flom LLP, Four Times Square, New York, NY 10036, and direct all phone calls to Skadden, Arps et al. at (212) 735-3000.

Respectfully submitted,

Date: February, 2002

By:  2/4/02
 Name: ROBERT LEE (print name)
 Title: PRESIDENT (print title)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : **Rothschild et al.** Patent No. : **5,822,523**
 Serial No. : **08/595,323** Issue Date : **October 13, 1998**
 Filed : **February 1, 1996**

CERTIFICATE OF MAILING

Title **Server-Group
 Messaging System for
 Interactive Applications**



I hereby certify that this paper and all enclosures referred to therein are being deposited with the United States Postal Service as First Class Mail, with sufficient postage in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231 on Feb. 15, 2002.
 Name of Person Mailing: **Josephine Hardy**

Josephine Hardy
 Signature of Person Mailing

TRANSMITTAL OF REVOCATION AND POWER OF ATTORNEY

Assistant Commissioner for Patents
 Washington, D.C. 20231

26137

Sir:

Enclosed please find a Revocation and Power of Attorney in the above-identified patent which revokes all previous powers of attorney and appoints the attorneys at Skadden, Arps, Slate, Meagher & Flom LLP to conduct all business in the Patent and Trademark Office connected therewith.

Accordingly, all correspondence should be addressed to Skadden, Arps, Slate, Meagher & Flom LLP, Four Times Square, New York, NY 10036, telephone number (212) 735-3000.

Respectfully submitted,

Andrew F. Strobert

Date: February 15, 2002

By: _____
 Andrew F. Strobert Reg. No. 35,375
 Skadden, Arps, Slate, Meagher & Flom LLP
 Four Times Square
 New York, NY 10036
 (212) 735-3000

Enclosure


UNITED STATES PATENT AND TRADEMARK OFFICE

 COMMISSIONER FOR PATENTS
 UNITED STATES PATENT AND TRADEMARK OFFICE
 WASHINGTON, D.C. 20231
 www.uspto.gov

APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
08/595,323	02/01/1996	DANIEL J. SAMUEL	16326.701

26137
 PATENT DEPARTMENT
 SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP
 FOUR TIMES SQUARE
 NEW YORK, NY 10036

CONFIRMATION NO. 4650


OC000000007717794

5822523

Date Mailed: 03/26/2002

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/22/2002.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

 DAVID O LIPSCOMB
 OPR (703) 308-7127

OFFICE COPY



04-06-06 #20 DAC
1.25c

THE UNITED STATES PATENT AND TRADEMARK OFFICE

RECEIVED

APR 12 2006

OFFICE OF PETITIONS

In re application of: Rothschild et al.
Patent No.: 5,822,523
Issued: October 13, 1998
Attorney Docket No.: 03-40008-US
For: Server Group Messaging System For Interactive Applications

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**NOTIFICATION OF CHANGE IN SMALL ENTITY STATUS
UNDER 37 CFR 1.28 (c)(1)(2)**

Dear Sir:

The owner of the above-identified patent application hereby notifies the Office of a change in status resulting in the loss of entitlement to small entity status as of October 1, 2000. Pursuant to 37 CFR 1.28 (c)(1)(2) submitted herewith is an itemization of the fees due along with Credit Card Payment Form 2038 in the amount of \$1,610.00 to cover the fees due.

March 26, 2002 first maintenance fee paid \$440.00
Large entity amount for first maintenance fee \$900.00

March 16, 2006 second maintenance fee paid \$1,150.00
Large entity amount for second maintenance fee \$2,300.00

Total due to cover the large entity fees \$1,610.00

The Commissioner is hereby authorized to charge any additional fees or credit any over-payment associated with this submission to Deposit Account No. 18-0586.

EXPRESS MAIL CERTIFICATE (37 CFR 1.10)

Express Mail Label No. EV 699479025 US

Date of Deposit April 5, 2006

I hereby certify that this paper, and the papers and/or fees referred to herein as transmitted, submitted or enclosed, are being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Name Cody M. McAtee

Signature

04/06/2006 SLUANGI 00000001 582E5E3

01 FC:1559

1610.00 DP

Respectfully submitted,
REED SMITH LLP

Edward F. Behm, Jr.
Registration No. 52,606
2500 One Liberty Place
1650 Market Street
Philadelphia, PA 19103-7301
(215) 241-5666
Fax: (215) 851-1420
Attorneys for Applicant



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450
www.uspto.gov

#21

EDWARD F. BEHM, JR.
REED SMITH LLP
2500 ONE LIBERTY PLACE
1650 MARKET STREET
PHILADELPHIA, PA 19103

COPY MAILED

OCT 26 2006

OFFICE OF PETITIONS

In re Patent No. 5,822,523
Issue Date: October 13, 1998
Application No. 08/595,323
Filed: February 1, 1996
Patentee: Jeffrey J. Rothschild, et al.

NOTICE

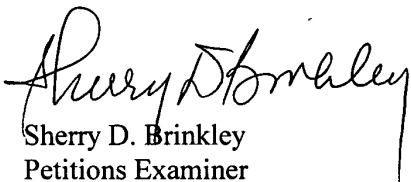
This is a notice regarding your request for acceptance of a fee deficiency submission under 37 CFR 1.28. On September 1, 1998, the Court of Appeals for the Federal Circuit held that 37 CFR 1.28(c) is the sole provision governing the time for correction of the erroneous payment of the issue fee as a small entity. See DH Technology v. Synergystex International, Inc. 154 F.3d 1333, 47 USPQ2d 1865 (Fed. Cir. Sept. 1, 1998).

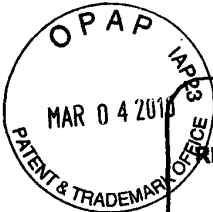
The Office no longer investigates or rejects original or reissue applications under 37 CFR 1.56. **1098 Off. Gaz. Pat. Office 502 (January 3, 1989)**. Therefore, nothing in this Notice is intended to imply that an investigation was done.

Your fee deficiency submission under 37 CFR 1.28 is hereby **ACCEPTED**.

There is no indication that the person signing the instant petition was ever given a power of attorney or authorization of agent to prosecute the above-identified application. However, in accordance with 37 CFR 1.34(a), the signature of Edward F. Behm, Jr. appearing on the petition shall constitute a representation to the United States Patent and Trademark Office that he is authorized to represent the particular party in whose behalf he acts.

Inquiries related to this communication should be directed to the Office of Petitions Staff at (571) 272-3201.


Sherry D. Brinkley
Petitions Examiner
Office of Petitions



Approved for use through 11/30/2011. OMB 0651-0035
 U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
 Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Patent Number	5,822,523
	Issue Date	Oct. 13, 1998
	First Named Inventor	Jeffrey J. Rothschild
	Title	Server-group messaging system for interactive applications
	Attorney Docket Number	630-009

I hereby revoke all previous powers of attorney given in the above-identified patent.

A Power of Attorney is submitted herewith.

OR

I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith: 27776

OR

I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

The address associated with the above-mentioned Customer Number.

OR

The address associated with Customer Number:

OR

Firm or Individual Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Country: _____

Telephone: _____ Email: _____

I am the:

Inventor, having ownership of the patent.

OR

Patent owner.
 Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on _____

SIGNATURE of Inventor or Patent Owner

Signature		Date	2/24/10
Name	Jason Katz	Telephone	202 629 5750
Title and Company	Paltalk Holdings, Inc.		

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. ...Submit multiple forms if more than one signature is required, see below.

Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(b)



Applicant/Patent Owner: Paltalk Holdings, Inc.

Application No./Patent No.: 5,822,523

Filed/Issue Date: 10/13/1998

Titled: SERVER-GROUP MESSAGING SYSTEM FOR INTERACTIVE APPLICATIONS

Paltalk Holdings, Inc., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

- 1. the assignee of the entire right, title, and interest in;
- 2. an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
- 3. the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy therefore is attached.

OR

B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Rothschild, J.; Kwiatkowski, M.; Samuel D. To: Hearme, Inc. (Mpath Interactive)

The document was recorded in the United States Patent and Trademark Office at
Reel 007861, Frame 0413, or for which a copy thereof is attached.

2. From: Hearme, Inc. To: Paltalk Holdings, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 012598, Frame 0506, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature

David M. Hill (46,170)

Printed or Typed Name

Date

02/25/2010

Attorney

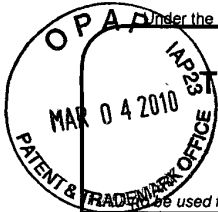
Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: TRAN.LET
 Document Description: Transmittal Letter

Approved for use through 07/31/2012. OMB 0651-0031
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
 Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



TRANSMITTAL FORM		Application Number	08/595,323
		Filing Date	02/01/1996
Total Number of Pages in This Submission		First Named Inventor	Rothschild, et al.
		Art Unit	N/A
4		Examiner Name	N/A
		Attorney Docket Number	630-009

ENCLOSURES (Check all that apply)		
<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input checked="" type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Terminal Disclaimer	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> Express Abandonment Request	<input type="checkbox"/> Request for Refund	Fee Address Transmittal form;
<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> CD, Number of CD(s) _____	Statement under 3.73(b);
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> Landscape Table on CD	Return Receipt postcard
<input type="checkbox"/> Reply to Missing Parts/ Incomplete Application	<input type="checkbox"/> Remarks	
<input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	Ward & Olivo		
Signature			
Printed name	David M. Hill		
Date	Feb 25, 2010	Reg. No.	46,170

CERTIFICATE OF TRANSMISSION/MAILING			
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	Raylene McDowell	Date	Feb 25, 2010

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Patent No. 5,822,523

NOTICE OF *EX PARTE* REEXAMINATION

Notice is hereby given that a request for *ex parte* reexamination of U.S. Patent No. 5,822,523 was filed on 06/14/10 under 35 U.S.C. § 302 and 37 C.F.R. § 1.510(a).

The reexamination proceeding has been assigned Control No. 90/011,033.

This Notice incorporates by reference into the patent file, all papers entered into the reexamination file.

Note: This Notice should be entered into the patent file.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
08/595,323	02/01/1996	DANIEL J. SAMUEL	630-009

CONFIRMATION NO. 4650

POA ACCEPTANCE LETTER

27776
WARD & OLIVO
SUITE 300
382 SPRINGFIELD AVENUE
SUMMIT, NJ 07901



Date Mailed: 07/15/2010

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/04/2010.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/ttkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
08/595,323	02/01/1996	DANIEL J. SAMUEL	16326.701

CONFIRMATION NO. 4650

POWER OF ATTORNEY NOTICE

26137
PATENT DEPARTMENT
SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP
FOUR TIMES SQUARE
NEW YORK, NY 10036



Date Mailed: 07/15/2010

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/04/2010.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervned as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/tkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101