cy; and *Figure 42* details steps carried out during *Figure 40* to negotiate a heartbeat rate.

Written Description of the Best Mode for Carrying Out the Invention

Figure 1

[0005] *Figure 1* illustrates a networked environment in which the invention may be used. A Real Time Data Provider **101** provides data to a number of terminals **102, 103, 104, 105, 106, 107, 108** and **109** via the Internet **110**. The data can be separated into at least two types. The first type is streamed data, which comprises updates of certain information that a user of a terminal has indicated that he is interested in. This could be, for example, financial data such as stock prices or exchange rates, sports data such as the latest football scores, news items and so on. A second type of data is transactional data. This comprises any data forming a transaction, which could be a financial transaction such as placing a bid to trade stocks or placing a bet on a sports fixture. Transactional data can also include logging-on or user profile activities.

[0006] The data is provided over a variety of networks, including radio networks such as mobile telephony networks or wireless networks. A Third Generation (3G) mobile telephony network, connected to the Internet **110**, includes a gateway **111** which provides connectivity to a network of base stations. Terminals **102** and **103** are each connected to one of these base stations. A General Packet Radio Service (GPRS) gateway **112** is connected to the Internet **110** and provides connection to a network of GPRS base stations. Terminals **104** to **106** are each connected to one of these stations. A GMS gateway **113** is connected to the Internet **110**, providing connectivity for terminal **107**. A terminal could, when possible, switch between connections as shown by dotted line **114**.

[0007] Internet Service Provider (ISP) **115** is connected to the Internet **110** and provides internet access for server **116**, server **117** and a Wireless Network or Wireless Fidelity (WiFi) gateway **118**. Terminal **108** has a link to gateway **118**. ISP **119** is connected to the Internet **110** and provides internet access for computer systems **120, 121, 122** and **123** via wire links. Terminal **109** is connected by an ethernet wire link, possibly using a docking cradle, to computer system **122**. Alternatively, server **124** is connected directly to the Internet **110**.

[0008] Thus there is a number of ways in which a terminal may link to the Internet **110** in order to receive data from RTDP **101**. There are, of course, other methods of connection and the rate of technological advance means that in the future there will be further methods. This description should not be construed as limiting connection methods to those described here. However, the number of methods makes the task of providing real time data difficult. While it is, for example, relatively easy to provide data quickly to terminals **108** and **109**, terminals **102** to **107** use relatively low bandwidth, high latency and high variability connections over which it is very difficult to provide real time data.

[0009] Mobile telephony systems such as those provided by gateways **111** to **113** are used to provide data. For example, mobile telephone users are able to browse the Internet **110**. However, the rate of data supply can be extremely slow. This is merely inconvenient when browsing. However, if data on the basis of which decisions are to be made is required, for example financial data, it must be provided in a timely fashion. This means that the data should arrive at the terminal quickly, and preferably it should be possible to indicate to a user how up-to-date the information is.

Figure 2

[0010] *Figure 2* illustrates a prior art method of supplying data from a server to a terminal over a telephony network. A server **201** on an ethernet network **202** supplies data packets to a first gateway **203**, where the data packets are placed on a high capacity data interconnect **204**. A router **205** receives these packets and supplies them to another network **206**. Eventually the packets arrive at a telecoms gateway **207**, where a telecoms provider can select which of several wireless networks to supply the packets to. A GPRS gateway **208** then supplies the packets to a GPRS router **209**, which routes the packets to the base station **210** to which the terminal **211** is currently connected.

[0011] This journey across several networks is facilitated by the Internet Protocol (IP) which provides a header at the start of every packet defining the destination IP address. Other information is also provided in the IP header, such as the size of the packet, but its primary function is to define an address that gateways and routers can read, and decide where the packet should be sent next. Packets are sent separately, and may end up taking different routes. It is therefore possible for packets to arrive out of order.

[0012] In order to maintain a dialogue between server **201** and terminal **211**, an additional protocol must be used. Most commonly, this protocol is the Transport Control Protocol (TCP). This enables a two-way link to be set up between two systems on the Internet **110**. Messages are sent, and TCP provides functionality such as acknowledging and resending data, if necessary, and reordering packets if they arrive in the wrong order. TCP was designed to be used on networks that have a high data capacity and low latency, but can suffer from congestion. However mobile telephony networks have different characteristics and TCP handles certain of these characteristics in an ineffective way.

[0013] In the communication chain shown in *Figure 2*, TCP (and other protocols) achieve effective communication across high-capacity parts of the Internet **110**. However, the final link to terminal **211**, over a low-capacity wireless connection, is extremely vulnerable. TCP fails

Ex.1079 / IPR2026-00210 / Page 662 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

to address these vulnerabilities effectively, since it was not designed for that purpose.

Figure 3

[0014] *Figure 3* shows a prior art graph of data against time for packets that are sent over the Internet **110**. Graph **301** illustrates the headers of a packet sent using a transport protocol such as TCP. The Internet **110** comprises many interconnected networks. As a packet is sent over each individual network, a local network protocol header **302** is attached to it, generally to transfer it from one part of the network to another. At the point of exit from the network, the network gateway will strip the local network protocol header 302, leaving the IP header **303**. From this the next destination on a neighbouring network is determined (the router uses various algorithms to work out the next intermediate destination). The local network protocol header is transient, and changes as the packet traverses the Internet **110**.

[0015] The IP header **303** defines the destination IP address for the packet. After this, there is the transport protocol header **304**, which is typically used by the communication client and server to form a connection over which communications can take place. Finally the remainder of the data packet **305** is the data payload. Some packets do not have data, and simply consist of signalling in the transport header **304**, for example an acknowledgement packet that tells the recipient that some data has been successfully received. Typically, though, acknowledgements are combined with data to reduce traffic.

[0016] An example of a transport protocol is TCP, as described with reference to *Figure 2*. TCP forms reliable connections and is often combined with higher protocols such as the File Transfer Protocol (FTP) or Hypertext Transport Protocol (HTTP).

Figure 4

[0017] *Figure 4* (prior art) illustrates a typical performance of TCP over a mobile telephony network. Graph **401** plots bandwidth **402** against time **403**. The upper line **404** shows theoretically available bandwidth over the network, while the lower line **405** shows the use made of the bandwidth using TCP.

[0018] TCP's performance is always less than 100%. When there are significant changes in network availability, TCP compensates inefficiently, because its underlying mechanisms make assumptions about the network that are invalid for a mobile connection. When bandwidth falls off, for example at point **406**, the amount of data sent using TCP falls much faster, because data packets that have been lost need to be resent, resulting in a downward spiral of lost bandwidth. TCP cannot anticipate or compensate fast enough to avoid such inefficiencies.

[0019] When a disconnection occurs, such as at point **407**, TCP takes a long time to re-establish data flow when the link is reconnected. When using a terminal on a mobile telephony network, such disconnections are frequent, for example when the user goes through a tunnel.

[0020] TCP presents another problem to real time data provision. When a disconnection takes place (as at point **407**), a wireless service provider will often perform a service known as "IP spoofing". This involves a proxy server being used to maintain the TCP connection with a server, even though the wireless connection is broken. When the connection is re-established data can be sent from where it is cached on the proxy server to the terminal. The telecoms provider does this so that a data transfer can continue, rather than being restarted every time the connection is lost.

[0021] This operation is helpful for internet browsing and downloading of large files to mobile telephones. However, it presents two problems to RTDP **101**. The first is that if the telecoms provider caches a large amount of streamed data and sends it all to a terminal upon reconnection this can overload the connection. This is especially inappropriate given that much of it may be out of date. The second problem is that the RTDP **101** might send transactional data to, for example, terminal **102** while it is disconnected from 3G gateway **110**. The 3G network, spoofing terminal **102**, will acknowledge this data. However, if terminal **102** does not reconnect, which might happen for one of many reasons, then the cached transactional data will never be forwarded. This results in RTDP **101** wrongly concluding that terminal **102** has received the data.

[0022] A further problem with TCP is that it is a connection-oriented protocol. When a client moves between wireless base stations its IP address can change, resulting in a requirement to set up a new TCP connection. This can interfere with communications. In particular, a secure transaction could be terminated. This also prevents a terminal from using a higher-bandwidth, lower latency network that may become available without terminating a connection, for example when a terminal connected to GPRS gateway **112** comes within range of 3G gateway **111**, or moves into the radius of a WiFi gateway **118**.

Figure 5

[0023] *Figure 5* shows RTDP **101** which comprises an application server **501** and a real time data server **502**. The real time data server communicates with a large number (potentially thousands) of terminals. It facilitates communications between the application server **501** and the terminals. Terminals can have a variety of types of connection, including high speed WiFi or wire. The real time data server **502** manages communications with all these types of connections. A terminal need not be mobile to take advantage of the system.

[0024] The application server **501** receives data from a number of data feeds. These are illustrated by two-way arrows, as data is provided to application server **501** but

Ex.1079 / IPR2026-00210 / Page 663 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

the server may also send information back, for example details of a financial transaction or an information request. Financial transaction services data feed 503 provides communications for making stock-market-based transactions. Sports transaction services data feed 504 provides communications for making sports-based transactions. Financial data feed 505 provides real time updates of, for example, share prices and exchange rates, while sports data feed 506 provides real time updates of sports scores. News data feed 507 provides news headlines and stories. It will be appreciated that the data feeds illustrated in *Figure 5* are representative of the type of data that a Real Time Data Server might provide to clients. Other data types and feeds are contemplated and included in this description.

[0025] The application server 501 communicates with the real time data server 502 over an outbound-initiated TCP-based link 508. The connection between the two systems is made via a high-speed Gigabit Ethernet connection. In other embodiments, the two servers could use the same processing system. However, this provides less security.

[0026] The application server 501 is protected by a first firewall 509, so as to resist any security vulnerabilities that may exist in the real time data server 502, which has its own firewall 510. The real time data server 502 takes data from the application server 501 and supplies it to terminals via the Internet 110 using a custom protocol called the Mobile Transport Protocol (MTP). This protocol addresses the needs of real time data services for mobile client terminals.

[0027] In the embodiment described herein the terminals are Personal Digital Assistants (PDAs) such as PDA 511. These are small portable devices including a display screen 512, control buttons 513, a speaker 514 and a microphone 515. The display 512 may be touch-sensitive, allowing the PDA 511 to be controlled using a stylus on the screen instead of buttons 513. A typical PDA is supplied with software providing the functionality of, inter alia, a mobile telephone, word processing and other office-related capabilities, a calendar and address book, email and internet access, games, and so on. The skilled reader will appreciate that the PDAs illustrated in this document are not the only terminals that can be used. For example, a mobile telephone with enough storage and memory could be used, or other devices which can communicate over mobile telephony networks.

[0028] PDA 511 may communicate with the real time data server 502 to obtain access to data provided by any of data feeds 503 to 507, or to obtain software downloads for installation. The application server 501 facilitates several different types of service. In particular, the efficient provision of multiple types of data having different characteristics is enabled using the custom protocol MTP.

[0029] The two main types of data are transactional data and streamed data. For transactional data, a two-way communication between the PDA 511 and the real time data server 502 facilitates the making of a secure transaction. Data delivery must be guaranteed even if a connection is broken. Such data may be several kilobytes for each message, requiring multiple datagrams to be transmitted before a message is complete. These packets, or datagrams, must be reassembled in the right order before use.

[0030] Streamed data comprises updates, for example of financial or sporting data. These may be provided at a fixed regular rate, or may be provided at an irregular rate as the data becomes available. Each update or message is contained in a single datagram (although a datagram may contain more than one message). For this reason it is not necessary for streamed datagrams to be ordered at the terminal.

[0031] Because of these different data types, each of which has its own issues to be addressed, MTP provides two types of data communication, transactional communication and streamed communication. It facilitates communication of both types over the same communication link. The data types are differentiated, such that the bandwidth utilisation is maximised without compromising transactional communications. It specifically addresses the need for bandwidth efficiency, latency measurement, multiple data types and continuous updates over a low bandwidth, high latency, high variability wireless mobile link. Also, because by its nature a mobile terminal such as a PDA has low storage and memory capabilities, it minimises the computational requirements of the terminal.

Figure 6

[0032] *Figure 6* details real time data server 502. It comprises a central processing unit (CPU) 601 having a clock frequency of three gigahertz (GHz), a main memory 602 comprising two gigabytes (GB) of dynamic RAM and local storage 603 provided by a 60Gb-disk array. A CD-ROM disk drive 604 allows instructions to be loaded onto local storage 603 from a CD-ROM 605. A first Gigabit Ethernet card 606 facilitates intranet connection to the application server 501. The intranet can also be used for installation of instructions. A second Gigabit Ethernet card 607 provides a connection to Internet 110 using MTP.

Figure 7

[0033] *Figure 7* details steps carried out by real time data server 502. At step 701 the real time data server 502 is switched on and at step 702 a question is asked as to whether the necessary instructions are already installed. If this question is answered in the negative then at step 703 a further question is asked as to whether the instructions should be loaded from the intranet. If this question is answered in the affirmative then at step 704 the instructions are downloaded from a network 705. If it is answered in the negative then at step 706 the instructions are loaded from a CD-ROM 707.

Ex.1079 / IPR2026-00210 / Page 664 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

[0034] Following either of steps 704 or 706 the instructions are installed at step 708. At this point, or if the question asked at step 702 is answered in the negative, the instructions are executed at step 709. At step 710 the real time data server is switched off. In practice this will happen very infrequently, for example for maintenance.

Figure 8

[0035] *Figure 8* details the contents of memory 602 during the running of real time data server 502. An operating system 801 provides operating system instructions for common system tasks and device abstraction. The Windows™ XP™ operating system is used. Alternatively, a Macintosh™, Unix™ or Linux™ operating system provides similar functionality. Real time data server instructions 802 include MTP instructions and instructions for providing MTP status information to the application server 501. Session data 803 comprises the details of every session, such as session item 804, currently maintained by the server 502. Each client terminal that is currently logged on has a session, and when a session starts an area of memory is allocated to it in which variables, specific to each user, are stored. Other data includes data used by the operating system and real time data server instructions.

Figure 9

[0036] *Figure 9* details an individual session item 804 shown in *Figure 8*. Each session item includes a session ID 901 and session state variables 902, indicating whether the session is starting, ongoing, stalled, reconnecting or disconnecting. Each item also includes transmitter data 903 and receiver data 904, since MTP provides two-way communication. Transmitter data 903 includes a transactional segment buffer 905, a streamed segment buffer 906 and prioritised message queues 907. Receiver data 904 includes a transactional segment buffer 908 and prioritised message queues 909.

Figure 10

[0037] *Figure 10* illustrates step 709 at which the real time data server instructions are executed. This step comprises a number of separate processes that effectively occur in parallel. The concurrency of these processes is achieved by a mixture of concurrent threads and sequential processing, details of which will be known to those skilled in the art. In particular, although the processes may be described in terms of communications with a single client, PDA 511, they should be understood to be relevant to all the clients that the real time data server 502 is communicating with.

[0038] Process 1001 transmits datagrams from the real time data server 502 to a client 511. Each packet includes an IP header, a UDP header and an MTP header. For convenience each packet is referred to as a datagram. Process 1001 comprises two separate processes: datagram preparation 1002 and output buffer processing 1003. Process 1002 prepares data for transmission. Data received from application server 501 can be from several applications having different data characteristics and priorities and it must be processed before it can be sent to terminals such as PDA 511.

[0039] Process 1004 receives datagrams from client terminals such as PDA 511 and comprises three separate processes: datagram reception 1005, transactional datagram processing 1006 and streamed datagram processing 1007.

[0040] Process 1008, which will be described further with reference to *Figure 27*, performs background processing, which includes various processes required to be performed while transmitting and receiving data, such as identifying timeout conditions.

[0041] Process 1009 provides session maintenance, which includes operations performed when PDA 511 is temporarily disconnected. This process, which will be described further with reference to *Figure 30*, is the first to start, with processes 1001, 1004 and 1008 being performed once the user session is established.

Figure 11

[0042] *Figure 11* illustrates the structure of a typical datagram 1101 sent between the real time data server 502 and PDA 511. A local network protocol header 1102 changes as the datagram passes from network to network across the Internet 110. An IP header 1103 defines the destination of the packet, as well as other characteristics. A UDP header 1104 precedes an MTP header 1105, which implements several features for efficiently supplying real time data to clients over mobile wireless links, as well as other data links of varying degrees of quality. The MTP header 1105 is followed by data 1106 that has a maximum length, in this embodiment, of approximately 500 bytes. This limit is chosen to avoid packet fragmentation and to avoid overloading the terminals, and could be varied.

[0043] The IP header 1103 includes several fields. Version field 1108 indicates the version of IP being used, for example IPv4 or IPv6. Internet Header Length field 1109 indicates the length, in 32-bit words, of the IP header. Its minimum value is 5. Length field 1110 gives the total length, in bytes, of the datagram, including the IP header (but not including the local network protocol header 1102). Protocol field 1111 is set to a value indicating that UDP is being used. Source IP address field 1112 gives the return address of the datagram, while destination IP address field 1113 gives its destination.

[0044] The UDP header 1104 has the following fields. Source port field 1114 gives the port on the computer sending the datagram, while destination port field 1115 gives the port number on the computer receiving the datagram. Length field 1116 gives the length of the datagram in bytes, including the UDP header but not including

Ex.1079 / IPR2026-00210 / Page 665 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

the previous headers 1102 and 1103. Checksum field 1117 contains a value computed from the IP header 1103, UDP header 1104 and the remainder of the datagram, enabling data integrity to be confirmed.

Figure 12

[0045] *Figure 12* details MTP header 1105. It contains a number of fields. Firstly, version number field 1201 gives the version of MTP being used.

[0046] Fields 1202 to 1209 are single-bit fields that are considered to be "set" if their value is one, and not set if it is zero. SYN field 1202 and KAL field 1213 are used for signalling. At the start and end of a session, SYN field 1202 is used for handshaking, but it is also used to perform various connection timing procedures. KAL field 1213 is used to send "keep alive" datagrams that indicate that a connection is open. ACK field 1203 indicates that the datagram is being used to acknowledge a received datagram, while EACK field 1204 indicates an extended acknowledgement. STREAM field 1205 is used to differentiate between streamed and transactional data. When set, it indicates that the datagram contains streamed data.

[0047] START field 1206 and END field 1207 are used to indicate that a datagram contains data and that it is the first or last of a set. If a datagram is too large to be sent as a single datagram then it may be split, and so START field 1206 indicates the first datagram and END field 1207 indicates the last. A datagram that has not been split has both fields set. An empty datagram does not have these fields set.

[0048] RESET field 1208 is used for session handshaking when restarting a session, and FINISH field 1209 is used to close an MTP session.

[0049] Session ID field 1210 is a number indicating which session the MTP datagram relates to. Sequence number field 1211 is a number indicating the datagram sequence. Each datagram that is sent out and that requires acknowledgement is given its own effectively unique number, which is then used in an acknowledgement by the client. (Since streamed and transactional datagrams are numbered using a different sequence, and since the sequence numbering loops at a number that is greater than the number of acknowledgements that will be outstanding at any time, the sequence number is not strictly unique but is effectively unique.) An acknowledgement is itself a datagram, which may contain data, and so acknowledgement number field 1212 is the sequence number of the datagram being acknowledged in a datagram that has the ACK field 1203 set. This datagram is probably otherwise unconnected with the datagram being acknowledged.

Figure 13

[0050] *Figure 13* details process 1002 at which datagrams are transmitted. Process 1001 comprises two, effectively concurrent processes 1002 and 1003. Process 1002 fills up the transactional and streamed segment buffers 905 and 906, while process 1003 looks in the buffers and marks the datagrams for sending.

[0051] Process 1002 commences with step 1301 at which a question is asked as to whether there is any data for transmission. If this question is answered in the affirmative then a further question is asked at step 1302 as to whether the data is transactional data. If this question is answered in the affirmative then at step 1303 a datagram is prepared and at step 1304 it is placed in the transactional segment buffer 905. Alternatively, if the question asked at step 1302 is answered in the negative, a datagram of streamed data is prepared at step 1305. The elapsed time value in the datagram is set to zero, indicating fresh data, at step 1306 and at step 1307 the datagram is placed in the streamed segment buffer 906.

[0052] Following steps 1303 or 1307, or if the question asked at step 1301 is answered in the affirmative, control is returned to step 1301 and the question is asked again as to whether there is any data for transmission.

Figure 14

[0053] *Figure 14* illustrates the process performed during steps 1303 to 1307, in which data is prepared for transmission. A datagram 1401 can comprise transactional data or streamed data, which is determined by whether or not STREAM field 1205 is set in the MTP header 1105. Each of the two types of data has its own buffer, transactional segment buffer 905 and streamed segment buffer 906, from which datagrams are sent. Once acknowledged, a datagram can be deleted from its location in segment buffer 905 or 906. Each segment buffer stores a number of datagrams.

[0054] Transmission is facilitated by supplying a datagram to the operating system 801, which facilitates its electronic transmission using the Internet Protocol.

[0055] Transactional and streamed datagrams are generated from data stored in prioritised message queues 907. This data is supplied to message queues 907 by applications running on application server 501. An application may supply all its outgoing messages to a particular message queue, or may pass messages to different queues depending upon the nature of the data.

[0056] Transactional data is supplied to prioritised message queues 1402, 1403 and 1404. Streamed data is supplied to prioritised message queues 1405, 1406 and 1407. Each message queue may contain a number of messages supplied from applications on application server 501. These messages are delineated by level one message headers, such as header 1408, that specify the length of the data and the application from which it was supplied.

[0057] The amount of data taken from each message queue and combined into a single datagram depends upon proportions defined for each message queue. For example, default proportions of fifty percent, thirty per-

Ex.1079 / IPR2026-00210 / Page 666 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

cent and twenty percent may be assigned to prioritised message queues 1405 to 1407 respectively. If message queue 1407 has no data then its allocation will be equally reallocated between queues 1406 and 1407, giving queue 1408 thirty-five percent and queue 1407 sixty-five percent. If only one queue contains data then it will have one hundred percent of the allocation.

[0058] The way the data is allocated also depends upon the type of message queue. Transactional messages may be broken up over a number of datagrams, and so the process only considers the amount of data in the queue. However, streamed messages must be wholly contained within one datagram, and so only entire messages are taken from these message queues, even if this means that the message queue's priority allocation is not used up.

[0059] Datagrams are created from the message queues and placed in segment buffers 905 and 906. These are then sent, with the first message being taken from each segment buffer in turn.

[0060] The example in *Figure 14* shows datagram 1401, which is made up from transactional data. The amount of data that can be included in the datagram is calculated, and data is taken from each of queues 1402 to 1404 according to their priority levels. Data from different prioritised message queues is delineated within a datagram by level two message headers, such as headers 1409, 1410 and 1411. These headers include a length field 1412 and a message queue field 1413.

[0061] Thus the example datagram 1401 does not contain a single message but in fact contains portions of five messages, since the data from each of queues 1402 to 1404 includes a message header and thus includes the end of one message and the beginning of another.

[0062] The number of prioritised message queues shown here and their proportions are provided as an example only. There could be fewer queues, for example only one transactional queue and two streamed queues, or any other number. The proportions will vary according to the kinds of real time data provided and the realities of each individual system. Additionally, it is not necessary that unused allocation be equally divided between the remaining queues. It could be divided according to their own allocations, or in some other way.

Figure 15

[0063] *Figure 15* details step 1303, at which a transactional datagram is prepared. At step 1501 an MTP header is created in a temporary buffer. This is a default headerthat as yet does not contain any information specific to the datagram being considered. This information is added by buffer processing process 1003, which will be described with reference to *Figure 17*. At step 1502 a variable N is set to be the number of transactional prioritised message queues 1402 to 1404 that contain data, and a variable Y is initialised to zero. At step 1503 the number of bytes available for data, indicated by variable S, is calculated by subtracting the product of N and the level two header size from the maximum data size. For example, the maximum data size may be 500 bytes.

[0064] At step 1504 the variable N is decremented by one and at step 1505 the highest message queue is selected. A variable P is set to be the sum of the proportion of the datagram that the data in that queue may use, for example 0.3 for queue P1, and variable Y (zero on the first iteration), and a variable X is set to be the amount of data, in bytes, in the queue. At step 1506 a question is asked as to whether the variable N is equal to zero. If this question is answered in the affirmative then the queue under consideration is the last one containing data and so the following steps need not be carried out, control being directed to step 1513.

[0065] However, if it is answered in the negative then at step 1507 a further question is asked as to whether the variable X is less than the product of the variables S and P; that is, whether the amount of data in the queue is less than the amount of data that may be used. If this question is answered in the affirmative then at step 1508 the variable Y is calculated as the variable X subtracted from the product of P and S, all divided by the product of S and N, all added to the previous value of Y. Thus Y is a proportion that is to be added to the proportions of the remaining queues in order to allocate to them the unused space allocated to the queue under consideration. For example, if the available space is 400 bytes and all three queues contained data, then P1 is allocated 120 bytes. If it only contained 100 bytes then a further 10 bytes would be allocated to each of the remaining queues. Y would thus be 0.05. Alternatively, if the question asked at step 1507 is answered in the negative, to the effect that the variable X is not less than the product of X and S, then at step 1509 the variable X is set to be the product of the variables P and S.

[0066] Following either step 1508 or step 1509, or if the question asked at step 1506 is answered in the affirmative, at step 1510 a level two header is created in the temporary buffer and the first X bytes are moved from the queue into the temporary buffer. The question is then asked at step 1511 as to whether the variable N is equal to zero. If this question is answered in the negative then control is then returned to step 1504 where N is decremented again before the next queue is selected. If it is answered in the affirmative then step 1303 is over and a datagram has been prepared. The step at 1304 of placing this datagram in the transactional segment buffer 905 consists of moving the data from the temporary buffer to he transactional segment buffer 905.

Figure 16

[0067] *Figure 16* details step 1305, at which a streamed datagram is prepared from the data in streamed prioritised message queues 1405 to 1407. At step 1601 an MTP header is created in a temporary buffer, and at step 1602 a variable N is set to be the number

Ex.1079 / IPR2026-00210 / Page 667 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

of streamed message queues that contain data, while variables X and Y are set to be zero.

[0068] At step 1603 the available space S is calculated in the same way as at step 1503, except that a further two bytes are subtracted, which will be used to store the elapsed time. At step 1604 the variable N is decremented by one.

[0069] At step 1605 a level two header is created in the temporary buffer, and at step 1606 the first message queue is selected, and a variable P set to be the sum of the queue's priority proportion and the variable Y. At step 1607 the first message in the queue is selected, and the variable X is set to be the sum of the message's length in bytes and the previous value of X. At step 1608 a question is asked as to whether the variable X is less than the product of the variables P and S.

[0070] If this question is answered in the affirmative then at step 1609 the message is moved to the temporary buffer and a further question is asked as to whether there is more data in the queue. If the question is answered in the negative then control is returned to step 1607 and the next message is selected.

[0071] If the question asked at step 1608 is answered in the affirmative, or the question asked at step 1610 is answered in the negative, then at step 1611 the variable X is reset to zero, and the variable Y is updated to be the previous value of the variable X subtracted from the product of P and S, all divided by the product of S and N, all added to the previous value of Y. A question is then asked at step 1612 as to whether N is equal to zero. If this question is answered in the negative then control is returned to step 1604. If it is answered in the affirmative then step 1605 is concluded.

[0072] Thus only entire messages are included in a streamed datagram, although more than one message may be contained in a single datagram. A streamed datagram may contain more than one message from a single queue, as long as it does not exceed its priority allocation, but may not contain a fragment of a datagram.

[0073] As discussed above, the algorithm presented in *Figure 15* and *Figure 16* is only one possibility for prioritising data.

[0074] Additionally, in another embodiment (not shown) this prioritisation and mixing of data does not take place. In that embodiment datagrams only contain data from a single application, and the START field 1206 and END field 1207 are used to indicate the beginning and end of messages, instead of the level one headers described with reference to *Figure 14*.

Figure 17

[0075] Output buffer processing 1003 is detailed in *Figure 17*. At step 1701 a question is asked as to whether both the transactional segment buffer 905 and the streamed segment buffer 906 are empty, and if this question is answered in the negative then the next datagram to be sent in either buffer 905 or 906 is marked for transmission (the process alternates between the two buffers) at step 1702. This may be the next newest datagram, or it may be an unacknowledged datagram that has been marked to be resent.

[0076] If the question asked at step 1701 is answered in the negative then at step 1703 a further question is asked as to whether an acknowledgement is required. If this question is answered in the affirmative then at step 1704 an empty acknowledgement datagram is created. If the question asked at step 1703 is answered in the negative then at step 1705 a further question is asked as to whether a heartbeat datagram is required, and if this question is answered in the affirmative then a latency-measuring datagram is produced at step 1706 (this will be described more fully with reference to *Figure 20*). If the question asked at step 1705 is also answered in the negative then control is returned to step 1701 and the question is asked again as to whether the buffers are empty.

[0077] Following any of steps 1702, 1704 or 1706, the MTP header as described in *Figure 12* is set at step 1707. At step 1708 the process waits for a transmission time, since the rate of datagram transmission is controlled, as will be described with reference to *Figure 29*. When this transmission time is reached, the time of sending is internally recorded for the purposes of delaying the next transmission. It is recorded with the datagram stored in the segment buffer, along with an indication of how many times the datagram has already been sent. At step 1710 a question is asked as to whether this datagram is being resent and is also a datagram containing streamed data, as indicated by the setting of both STREAM field 1205 and START field 1206; if so the elapsed time is changed at step 1711 to reflect the amount of time since the first attempt at sending the datagram, as can be calculated from the time of the last sending and any previous value of the elapsed time. This is to facilitate the calculation of resend latency, as will be described with reference to *Figure 41*. Finally, at step 1712, the datagram is sent.

Figure 18

[0078] *Figure 18* details step 1705, at which the MTP header is set. At step 1801 a question is asked as to whether there is a datagram received from the client that needs to be acknowledged. The answer to this question depends not only on whether a datagram has been received from PDA 511 but also what kind of datagram it is. A datagram containing transactional data is acknowledged immediately, as is any datagram being used for timing purposes, and so if either of these have been received but not acknowledged the question is answered in the affirmative. Streamed data, being less critical, is acknowledged using an extended acknowledge, in which multiple packets are acknowledged in order to lower network traffic. Thus if only streamed datagrams have been received then the question will be answered in the affirmative only if a suitable period of time has elapsed. Oth-

Ex.1079 / IPR2026-00210 / Page 668 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

erwise, or if no datagrams have been received at all, the question is answered in the negative.

[0079] If the question asked at step 1801 is answered in the affirmative then at step 1802 ACK field 1203 is set and the sequence number of the datagram being acknowledged is entered in acknowledgement number field 1212. At step 1803 a question is asked as to whether this acknowledgement is an extended acknowledgement. If this question is answered in the affirmative then at step 1804 the EACK field 1204 is also set, and any datagrams that have not been received but have lower sequence numbers than the sequence number contained in field 1212 are listed as data in part 1106 of the datagram. Thus these datagrams are negatively acknowledged. Since the IP header 1103 and UDP header 1104 both contain length fields indicating the total length of the datagram the recipient of an extended acknowledgement knows implicitly how many datagrams are being negatively acknowledged. At this point, and if the question asked at step 1803 is answered in the negative, step 1705 is completed. (Note that because transactional datagrams have a separate sequence number from streamed datagrams, the extended acknowledgement process does not interfere with the acknowledgement of transactional datagrams.)

[0080] However, if the question asked at step 1801 is answered in the negative, to the effect that an acknowledgement is not due, at step 1805 a further question is asked as to whether a latency measurement or heartbeat should be initiated. If this question is answered in the affirmative then at step 1806 SYN field 1202 is set to one. A datagram having this field set initiates a latency measurement. When an acknowledging datagram is received from PDA 511 it is used to measure round-trip latency (further described with reference to *Figure 17*). (Thus the SYN field cannot be set in an acknowledging datagram. For this reason step 1805 is only initiated if the question asked at step 1801 is answered in the negative.) Alternatively, if no data is being sent, a datagram having this field set, in addition to being used to measure latency, provides a heartbeat that confirms that the connection is still open.

[0081] Following step 1806, or if the question asked at step 1805 is answered in the negative, step 1705 is completed.

[0082] This figure highlights one of the few ways in which the server and the client are not symmetrical. While a session is stalled, the server will not send heartbeat datagrams, but the client will. This is because the receipt of a datagram from the client by the server ends the stall. This is provided by the suspension of background processing process 1008, which makes the decision as to whether to send a heartbeat datagram, during a stalled session. However, process 1003 sends the datagram, if instructed to, in exactly the same way on both the server and the client.

Figure 19

[0083] *Figure 19* details process 1005 that receives datagrams sent by PDA 511. At step 1901 an incoming datagram is received and the receive time logged. A question is then asked at step 1902 as to whether the datagram has a sequence number identical to a recently received datagram of the same type (ie streamed or transactional). This can happen when acknowledgements and resends "cross" and when acknowledgements are lost over the network. Thus if this question is answered in the affirmative then control is directed to step 1912 and the datagram is acknowledged without being processed. Alternatively, if it is answered in the affirmative, then at step 1903 a question is asked as to whether the SYN field 1202 is set, indicating that the datagram is a latency-measurement datagram. Thus if this question is answered in the affirmative then at step 1904 a further question is asked as to whether ACK field 1203 is also set. If this question is also answered in the affirmative then the datagram is a returned latency-measurement datagram and so the latency is calculated at step 1905.

[0084] Alternatively, if it is answered in the negative, then at step 1906 a question is asked as to whether the acknowledgement number field 1212 is zero. If this question is answered in the affirmative then the ACK field is not set but an acknowledgement number is given. This indicates that the acknowledgement field does not contain a sequence number but indicates a new heartbeat rate, measured in milliseconds, and thus the heartbeat timing rate contained in the session data 804 is updated at step 1907. This process will be described further with reference to *Figure 42*.

[0085] Following either of steps 1907 or 1905, or if either the question asked at step 1903 is answered in the negative or that asked at step 1906 is answered in the affirmative, then control is directed to step 1908, at which a question is asked as to whether the datagram contains streamed data, as indicated by the setting of STREAM field 1205. If this question is answered in the affirmative then the resend latency is recalculated at step 1909. Resend latency, in combination with connection latency, is used to estimate the age of data received, and is described further with reference to *Figure 41*.

[0086] Following this, or if the question asked at step 1908 is answered in the negative, acknowledgements and state changes are processed at step 1910, as will be further described with reference to *Figure 21*.

[0087] Finally the data 1106 is extracted at step 1911, as will be further described with reference to *Figure 23* and *Figure 24* and the datagram acknowledged at step 1912. The processing steps 1901 to 1910 relate only to the information contained within the MTP header 1105, much of which is not connected with the data in any way.

Ex.1079 / IPR2026-00210 / Page 669 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Figure 20

[0088] *Figure 20* illustrates the use of the SYN field **1202** to measure connection latency. It is necessary that at all times the client terminals are aware of exactly how old the data is. This is not possible using traditional methods such as, for example, clock synchronisation, because there may be thousands of terminals. Thus the system described herein provides a method of measuring the connection latency between the RTDP **101** and each of its terminals.

[0089] A latency-measurement datagram is sent at regular intervals by setting the SYN field **1202** in an outgoing datagram in either transactional segment buffer **905** or streamed segment buffer **906** and noting the time at which it was sent. As an example, transactional segment buffer **905** is shown, containing several packets **2001, 2002** and **2003**. The question asked at step **1606** is answered in the affirmative, to the effect that a latency measurement should be initiated, and so the SYN field **1202** of the next datagram to be sent, which is datagram **2001**, is set.

[0090] Datagram **2001** takes a number of milliseconds, shown by arrow **2004** and identified by the variable A, to be transmitted to PDA **511**, whose receive buffer **2005** is shown. A process running on PDA **511**, which is substantially identical to process **1035**, sets the SYN field **1202** and the ACK field **1203** in its next outgoing datagram **2006**. This process takes a time indicated by arrow **2007** and identified by the variable B. Finally, transmission of datagram **2006** back to real time data server **502** takes a time indicated by arrow **2008** and identified by the variable C. When datagram **2002** is received at real time data server **502** the fact that both the SYN and ACK fields are set triggers latency calculation at step **1905**.

[0091] The round trip time, which is obtained by comparing the receive time of datagram **2002** with the transmission time of datagram **2001**, is equal to the sum of the variables A, B and C. Since network conditions are, on average, symmetric, A is assumed to be approximately equal to C. B is very small because it is possible to directly acknowledge packet **2001** without waiting for any out-of-order datagrams that would have to be received if the latency was measured using a cumulative acknowledgement, as with TCP. Thus, as shown by equation **2009**, the two-way latency is approximately equal to the round trip time, and the one-way latency, or connection latency, is half the round trip time.

[0092] Having obtained a value for the round trip time, it is filtered using equations **2007**. K is an adaptive filter coefficient that is varied in order to optimise the ability of the filtered latency to follow quick changes when these are consistently observed. Thus the filtered latency is equal to the sum of the following factors: K subtracted from one all multiplied by the measured latency; and K multiplied by the previous filtered latency calculation. Other filtering or weighting methods may be used in order to smooth the variability of the latency calculation.

[0093] The round trip time is used by both the server and the client to determine the length of time that should be waited for an acknowledgement before a transactional datagram is resent (timeout). Since streamed datagrams may be acknowledged using an extended acknowledgement, the time that a process waits before sending an extended acknowledgement is added to the latency value to produce the timeout for streamed datagrams. The constant measurement of the latency described above ensures that the timeout settings are as accurate as possible. A fixed timeout setting can be set too high, in which case the wait before resend would be too long, thus degrading the timeliness of the data, or it can be too low, resulting in too many resends. This dynamic timeout creates a compromise.

[0094] The round trip time may be halved to give a connection latency, which indicates the approximate time taken by a datagram to be sent from the server to the client. This value is used by the client to indicate the timeliness of received data, and will therefore be described further with reference to *Figure 41*. Resend latency measurement, which will be described with reference to *Figure 41*, is also calculated at both the client and the server end but in this embodiment is only used by the client. It will therefore not be discussed at this stage.

Figure 21

[0095] *Figure 21* details step **1910** at which acknowledgements and state changes are processed. At step **2101** a question is asked as to whether the RESET field **1206** or FINISH field **1209** (as contained in the MTP header **1105** of the datagram received at step **1901**) is set, indicating that the session should be reset or ended. If this question is answered in the affirmative then a disconnect takes place at step **2102**. This concludes step **1910** if this route is taken.

[0096] If the question asked at step **2101** is answered in the negative then at step **2103** a question is asked as to whether EACK field **1204** is set, indicating that the datagram contains an extended acknowledge. If this question is answered in the affirmative then at step **2104** the extended acknowledgement is processed. If it is answered in the negative then at step **2105** a further question is asked as to whether ACK field **1203** is set, indicating that the datagram contains an acknowledgement. If this question is answered in the affirmative then at step **2106** the acknowledgement is processed by removing the datagram that has the sequence number contained in SEQUENCE NUMBER field **1211** from the relevant segment buffer **905** or **906**. If it is answered in the negative, or following step **2104**, the session state variables **902** for PDA **511** are modified if necessary.

Figure 22

[0097] *Figure 22* details step **2104**, at which an extended acknowledgement is processed. As described previ-

Ex.1079 / IPR2026-00210 / Page 670 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

ously with reference to step 1904, an extended acknowledgement is in the form of a datagram with EACK field 1204 set, a streamed datagram sequence number contained in acknowledgement number field 1212, and possibly a list of streamed datagram sequence numbers that have not been received by PDA 511 as data 1108. Thus the process has a range of datagram sequence numbers to consider. This range starts at the number following the sequence number contained in the last extended acknowledgement and finishes at the number contained in the extended acknowledgement currently being considered.

[0098] Thus at step 2201 the first sequence number in this range is selected. At step 2202 the streamed datagram corresponding to this sequence number is identified and at step 2203 a question is asked as to whether the sequence number identified at step 2201 is in the list of negatively acknowledged datagrams contained in data 1108 of the datagram. If the question is answered in the negative then the sequence number is being acknowledged and this is processed at step 2205. If the question is answered in the affirmative then, since the identified datagram is still stored in its relevant segment buffer 905 or 906, it is marked to be resent at step 2204.

[0099] At step 2206 a question is asked as to whether the sequence number being considered is the same as the number contained in the acknowledgement number field 1212 of the datagram. If this question is answered in the negative then control is returned to step 2201 and the next sequence number is selected. If, however, it is answered in the affirmative, then the extended acknowledgement has been fully processed and step 2104 is completed.

Figure 23

[0100] *Figure 23* illustrates the reception of a datagram from PDA 511. A receive buffer is provided by the operating system 801, which supplies a datagram to receiving transactional segment buffer 908 or to process 1007, via process 1005. Once datagrams are ordered within transactional segment buffer 908, process 1006 decodes the level two message headers in the datagrams to split the data up and place it in the correct one of prioritised message queues 910. There are three transactional queues 2301, 2302, and 2303, corresponding to the message queues 1402 to 1404. Process 1007 performs the same function for streamed datagrams. There is no streamed segment buffer for incoming datagrams because there is no ordering necessary. There are three streamed queues 2304, 2305 and 2306. These correspond to the prioritised message queues 1405 to 1407. Once the data is placed in the queues, level one headers indicate to the applications that a message is complete and can be used.

[0101] In the alternative embodiment described with reference to *Figure 16*, wherein mixing of the data is not used, only the transactional data need be ordered in the segment buffer 908. In this embodiment every streamed message is contained in a single datagram and so need not be ordered. If an old update arrives after a new one then the old one is simply discarded by the relevant application. However transactional data, which usually stretches over more than one datagram, must be ordered. The START and END fields 1206 and 1207 are used to indicate when a message is finished and can be transferred to the relevant message queue.

Figure 24

[0102] *Figure 24* details step 1911, at which the data contained in a received datagram is extracted and acknowledged. At step 2401 a question is asked as to whether the received datagram contains data in portion 1106. If this question is answered in the negative then a further question is asked at step 2402 as to whether STREAM field 1205 is set, indicating that the datagram contains streamed data. If this question is answered in the negative then at step 2403 the data is placed in transactional segment buffer 908, while if it is answered in the affirmative then the data is passed to process 1007 at step 2404.

[0103] Following step 2404, or if the question asked at step 2401 is answered in the negative, to the effect that the datagram contains no data, then a question is asked at step 2405 as to whether SYN field 1202 is set, indicating that the datagram is a latency measurement or heartbeat datagram. If this question is answered in the affirmative, or following step 2403, the datagram is immediately acknowledged at step 2406. This step involves flagging the sequence number in order that process 1003 acknowledges it in the next available outgoing datagram at step 1707 as described with reference to *Figure 19*. (If there is no outgoing datagram, then an empty streamed datagram is created.) At this point, or if the question is answered in the negative, step 1911 is concluded. Thus transactional and latency-measurement datagrams are acknowledged immediately. Streamed datagrams are acknowledged using an extended acknowledgement, and empty datagrams that are not tagged, for example an acknowledgement containing no data, are not themselves acknowledged.

Figure 25

[0104] *Figure 25* details process 1006 which processes the datagrams placed in the transactional segment buffer 908. At step 2501 a question is asked as to whether there is data in the transactional segment buffer, and if this is answered in the negative then the question is asked again until it is answered in the affirmative, when at step 2502 a question is asked as to whether the first datagram in the segment buffer has the next expected sequence number and is complete (as described with reference to *Figure 12*, a datagram can be split over more than one datagram, and if this happens then the full set of datagrams must be received before they can be proc-

Ex.1079 / IPR2026-00210 / Page 671 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

essed). If this question is answered in the affirmative then the datagram can be processed, and at step **2504** the first level two message header in the datagram is read to obtain the length of the data following it and the message queue into which it is to be placed. The indicated amount of data is then removed from the segment buffer and placed in the correct queue at step **2505**, with the level two header and MTP header being discarded. At step **2506** a question is asked as to whether there is another level two header, and if this question is answered in the affirmative then control is returned to step **2504**. If it is answered in the negative, or if the question asked at step **2503** is answered in the negative, to the effect that the next datagram in segment buffer **908** is not the next expected one, control is returned to step **2501** and the process waits for more data.

Figure 26

[0105] *Figure 26* details process **1007**, which processes incoming streamed datagrams. Since streamed datagrams do not have to be ordered, there is no necessity for an incoming streamed segment buffer. Thus at step **2601** a streamed datagram is received from process **1005**, and at step **2602** the first level two message header in the datagram is read to obtain the length of the data following it and the message queue into which it is to be placed. The indicated amount of data is then removed from the datagram and placed in the correct queue at step **2603**, with the level two header and MTP header being discarded. At step **2604** a question is asked as to whether there is another level two header, and if this question is answered in the affirmative then control is returned to step **2602**. If it is answered in the negative, control is returned to step **2601** and the process waits for more data.

Figure 27

[0106] *Figure 27* details background processing process **1008**. (This process is suspended on the server if the session is stalled. It is never suspended on the client.) At step **2701** the process considers whether or not a latency-measurement datagram needs to be sent. If so, a flag is set which triggers the question asked at step **1805**, as to whether such a datagram should be sent, to be answered in the affirmative. It also triggers the question asked at step **1702** as to whether a heartbeat datagram is needed, which is asked only if both segment buffers are empty, to be answered in the affirmative. Thus if there is an outgoing datagram at the point where a latency-measurement datagram is required, then that datagram has its SYN field **1202** set. However, if there is no outgoing datagram then process **1003** creates one at step **1703**. This is referred to as a heartbeat, but it is also a latency-measurement datagram. (It is also possible to use the KAL field **1213** as a heartbeat. A datagram with this field set is not acknowledged and not used as a latency-measuring datagram, but merely indicates that the connection is open.)

[0107] At step **2702** the process negotiates a new heartbeat rate, if required. This is the maximum interval that should pass without data being sent on either the server or client side. If no data is sent, then a heartbeat datagram, which is an empty streamed datagram with the SYN field **1202** set, is sent. The server does not send heartbeats during stalling of a session. This is achieved by the suspension of process **1008** when a session is stalled. The negotiation of a heartbeat rate, although available to both client and server, is in this embodiment predominantly initiated by the client and will therefore be described with reference to *Figure 42*.

[0108] At step **2703** the process flags the necessity for an extended acknowledgement, if one is due, which leads to the question asked by process **1003** at step **1803** being answered in the affirmative. At step **2704** the process marks for resending any datagrams that have not been acknowledged within a timeout, and are thus still within their respective segment buffer **905** or **906**. This is done by flagging the datagram for resending, and it also increments the value in resend field **1119** by one, to indicate the number of times the datagram has been resent.

[0109] At step **2705** the process updates the timeouts based on connection characteristics. The timeout for a transactional datagram is equal to (or slightly larger than) the round trip time calculated at step **1905**. The timeout for a streamed datagram is equal to (or slightly larger than) the round trip time calculated at step **1905** plus the time that the process will wait before sending an extended acknowledgement.

[0110] At step **2706** the process recalculates the data transmission rate, if necessary. This recalculation is done at specified intervals, and thus may not be carried out on every cycle.

[0111] At step **2707** the process sends an update of network characteristics to the application server, for use by the applications. In this embodiment this update includes the amount of data currently being sent per second (in datagrams or in bytes), the amount of data in the segment buffer that has the most data, or alternatively in both segment buffers, and the round trip time; in other embodiments the update could include more or less information.

[0112] Control is then returned to step **2701** and the process cycles until terminated.

Figure 28

[0113] *Figure 28* illustrates an extended acknowledgement. The MTP header **1105** and data **1106** of a datagram are shown. In the header **1105** the EACK field **1204** is set. The acknowledgement number field **1212** contains the sequence number of the most recent streamed datagram received. The data portion **1106** contains a list of sequence numbers **2801**, **2802** and **2803**

Ex.1079 / IPR2026-00210 / Page 672 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

that are lower than the number contained in field 1212 but which have not been received. The datagrams corresponding to these numbers are therefore negatively acknowledged.

[0114] Thus data packets or datagrams are transmitted from a first station such as RTDP 101 for reception at a second station such as PDA 511. The PDA 511 receives at least one of the transmitted packets in an input buffer, identifies at least one transmitted packet that has not been received as an identified non-received packet, and transmits an indication back to the server station indicating the identified non-received packet.

Figure 28A

[0115] *Figure* 28A illustrates two of the different ways in which transactional and streamed data is treated. The word data is herein applied to all kinds of data, including the information received from feeds 503 to 507, the messages containing the information produced by application server 501 and the datagrams that contain a part or whole of these messages produced by real time data server 502, the messages received by a terminal and the information displayed by that terminal to the user.

[0116] Application server 501, part of real time data provider 101, produces transactional messages 2811, 2812, 2813 and 2814 and streamed messages 2815, 2816, 2817 and 2818. Process 1102 on real time data server 502 sends these messages to a terminal such as PDA 511 in the form of datagrams. Transactional messages 2811 to 2814 are split and sent as part of datagram 2819, 2820 and 2821. For example, datagram 2819 may consist of a part of message 2811, a part of message 2812 and a part of message 2814. Streamed messages 2815 to 2818 are not split. Thus datagram 2825 consists of the whole of messages 2815 and 2816. Datagram 2826 consists of message 2817. The whole of message 2818 cannot also fit into the datagram, and so it is sent even though it is not at the maximum size. Datagram 2827 contains message 2818. Thus transactional messages may be split over at least two datagrams, while streamed messages must be contained within a datagram.

[0117] Another difference in the treatment of transactional and streamed data is the method of acknowledgement. Thus each of transactional datagrams 2819 to 2821 is individually acknowledged using acknowledgements 2822, 2823 and 2824. However, streamed datagrams 2825 to 2827 may be acknowledged by PDA 511 using a single extended acknowledgement 2828, unless they are control datagrams that have a field such as SYN 1202, RESET 1208 or FINISH 1209 set, in which case they are individually acknowledged.

Figure 29

[0118] *Figure 29* details step 2706, at which the data transmission rate is calculated by updating the transmission interval (the time that process 1003 waits after sending a datagram before sending another datagram). Although each of the streamed and transactional data being sent from the RTDP 101 to each of its clients is relatively small in data terms, it must be provided in a timely fashion. Congestion should therefore be avoided. Existing protocols such as TCP merely react to congestion rather than preventing it, and as shown in *Figure 4* have a very slow restart when a connection is cut off.

[0119] This problem is solved by having a separate transmission rate for each terminal, and constantly monitoring each of these rates to keep it optimum. Thus at step 2901 a question is asked as to whether the interval since the last update is less than the product of 1.25 and the round trip time calculated at step 1905. If this question is answered in the negative then it is not yet time to perform the calculation and step 2706 is concluded. This is because the effect of a previous update to the transmission rate is not felt until at least one round trip time later, and thus the calculation interval is a small amount more than the round trip time - a quarter of the round trip time in this embodiment.

[0120] However, if the question is answered in the affirmative then at step 2902 the total number of resends in the streamed segment buffer 906 is determined and set as the value of a variable R. The number of resends is a sum of the number of datagrams in the buffer that are tagged to be resent, with an indication that a datagram is on its second resend adding two to the total, an indication that a datagram is on its third resent adding three to the total, and so on.

[0121] At step 2903 a question is asked as to whether the value of R is zero, meaning that there are no datagrams in the buffer that are being resent. This indicates that the rate of transmission can be increased. Thus if this question is answered in the affirmative then a further question is asked at step 2904 as to whether the current interval between transmissions is significantly larger than a value saved as the "current best interval". If this question is answered in the affirmative then the transmission interval is decreased by a first, larger amount at step 2905, while if it is answered in the negative then the transmission interval is decreased by a second, smaller amount at step 2906. This means that when the transmission interval is much larger than the last known achievable interval, the transmission interval is decreased much faster than when it is close to it.

[0122] If the question asked at step 2903 is answered in the negative, to the effect that R is not zero, then at step 2907 a question is asked as to whether R is less than a certain threshold. If this question is answered in the affirmative then the transmission rate is not changed. If, however, it is answered in the negative then a further question is asked at step 2908 as to whether R is significantly smaller than the previous value of R. If this question is answered in the affirmative then the rate is not altered, even though R is above the threshold, because this value of R may be an anomaly.

Ex.1079 / IPR2026-00210 / Page 673 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

[0123] If R is above the threshold and not significantly smaller than the previous R, then this indicates that there are too many resends and the interval between datagram transmissions needs to be increased. However, first a question is asked at step **2909** as to whether the last change in the interval was a decrease. If this question is answered in the affirmative then the current transmission interval is the lowest known achievable interval at the current time, and so it is saved as the current best at step **2910**. The transmission interval is then increased at step **2911** (the step size used in this embodiment is larger than both of the step sizes used for decreasing the transmission interval).

[0124] The algorithm described herein is a robust method of attempting to increase the rate of datagram transmissions while minimising the number of resends, using continual and rapid adjustment. It provides a quick response to decreases in the available network bandwidth and a fast restart when transmission is temporarily cut off or after a congestion spike. Clearly the implementation details of the algorithm, such as the number of step sizes and what is meant by "significantly large" could be changed.

[0125] In this embodiment, due to the small receive buffer of PDA **511**, it is only possible to send one datagram at a time. However, in other embodiments, the method could be altered by sending more than one datagram at once when the transmission interval reaches a certain low threshold. It can be more efficient to send two packets at once at a larger interval than to continue decreasing the transmission interval.

[0126] Additionally, in another embodiment it could be the transactional segment buffer or both segment buffers that are considered when summing the resends.

Figure 30

[0127] *Figure 30* details process **1009**, which performs session maintenance. This process notes certain information available in the headers of datagrams as they arrive and maintains the client sessions accordingly, but does not interfere with the processing of the datagrams. Thus at step **3001** a datagram is received, and at step **3002** a question is asked as to whether the datagram header contains valid session details, for example session number, encryption and so on.

[0128] If this question is answered in the negative, meaning either that the datagram has no session number or that it contains invalid session details, then at step **3003** a further question is asked as to whether the datagram is requesting a new session, indicated by the lack of a session number and the setting of SYN field **1202**. If this question is answered in the affirmative then at step **3004** a new session is created for the client that sent the datagram. This includes creating session data **803** and validating the new session, ie checking whether a valid account number for an active account, valid name and correct password have been supplied, and is in practice performed by calling a subroutine on application server **501**, on which the user details are stored.

[0129] An answer in the negative to the question asked at step **3003** means that there is a problem of some kind with the datagram, for example it relates to a terminated session or the session details do not match, and so the session is ended at step **3012** by sending a reset datagram (a datagram in which the RESET field **1108** is set) to the originating IP address and removing the session data, if there is any.

[0130] If the question asked at step **3002** is answered in the affirmative, to the effect that the session details are valid, then a further question is asked at step **3005** as to whether the IP address from which the datagram was sent matches the IP address held in the session variables. If this question is answered in the negative then at step **3006** the IP address is updated in the session variables. The client could change IP addresses for a number of reasons. The main ones are that a client that has moved between networks or cells, thus changing its mobile IP address, or that a client deliberately terminated its IP connection in order to fully use bandwidth for another function, for example to make a telephone call. In this case the client would probably be assigned a different IP address on reconnection, even if it is in the same cell of the same network. However, this functionality of MTP allows the client to immediately restore the session without visible delay to the user.

[0131] At step **3007** a question is asked as to whether the datagram is terminating the session, indicated by a setting of FINISH field **1209**. If this question is answered in the affirmative then the session is ended at step **3012**, but if it is answered in the negative then at step **3008** a question is asked as to whether another datagram has been received for this session within two timeouts and if is answered in the affirmative then control is returned to step **3001**. This timeout is different from the resend timeouts discussed with reference to *Figure 27*, and is set by the heartbeat rate. The heartbeat rate is the maximum interval which should pass without receiving data from a client.

[0132] Thus, if the question is answered in the affirmative, indicating that since the receipt of the last datagram a period of time equal to two timeouts has passed with no further communication from the client, then at step **3009** the session is placed in a stalled state. This involves noting in the session variables that the session is stalled, which prevents any more datagrams from being sent to the client. In this embodiment, this involves suspending datagram reception process **1104** and background processing process **1105**. A stalled session can occur because the network connection to the client has been broken, because the PDA **511** does not currently require the real time data and has therefore stopped communicating, because the PDA **511** has been switched off without ending the session, and so on.

[0133] At step **3010** a question is asked as to whether a datagram has been received for this session within ten

Ex.1079 / IPR2026-00210 / Page 674 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

minutes of the session being placed in a stalled state, and if this question is answered in the affirmative then the stall is ended and control is returned to step 3001. Ending a stall involves changing the session state and restarting any suspended processes. This will then have the effect of resending any datagrams that have not been acknowledged. However, in an alternative embodiment the streamed data buffer 506, and possibly the streamed message queues 1405 to 1407, could be flushed on the ending of a stall.

[0134] If, however, the question asked at step 3010 is answered in the negative then at step 3012 the session is ended. The session is closed after a long stall firstly for security measures, because the user may have left his terminal unattended, and secondly to prevent memory space being used for an unwanted session, for example if the terminal has been switched off.

[0135] Stalling as described above solves the problem with spoofing - that on reconnection the telecoms gateway sends a large amount of data all at once to the terminal, thus negating any value obtained by managing data transmission rate as described with reference to *Figure 29*. Instead, when the connection is broken and the real time data server 502 stops receiving datagrams from PDA 511 the session is stalled and the real time data server 502 sends no more datagrams. Thus the telecoms gateway builds up a very small amount of data, if any, to send on when the connection is re-established.

[0136] The second problem solved here is the maintenance of a session when the PDA 511 moves between cells in a telecoms network or indeed between networks. As soon as an incoming datagram that has the correct session ID and encryption but a different IP address is received, the IP address in the session data 804 is immediately updated so that datagrams intended for PDA 511 are sent to that IP address. The user therefore perceives very little, if any, delay when moving between IP addresses.

Figure 30A

[0137] The updating of IP addresses described with respect to step 3006 is illustrated in *Figure 30A*. A session is described by its session data 804 stored on application server 501. It includes a session ID field 901 containing a session ID 3020 and an IP address field 3021 containing an IP address 3022. The session may be in an active state or may move to a stalled state, as shown by arrow 3023, when no communication is received from the client within two timeouts as set by the heartbeat rate.

[0138] A datagram 3024 is received by real time data server 502. It includes a source IP address field 1112 in its IP header 1103 and a session ID field 1210 in its MTP header 1210. The session ID 3020 matches the session ID in field 901. However, the IP address 3025 does not match the IP address 3021 in the IP header 3022. The session data 804 is therefore updated immediately by replacing the IP address in field 3021 with IP address 3025. All datagrams produced are now sent to this new address. Receipt of datagram 3024 also ends any stall, if one existed, and so the session is shown as active.

Figure 31

[0139] *Figure 31* details application server 501. It comprises a central processing unit (CPU) 3101 having a clock frequency of 3GHz, a main memory 3102 comprising 2GB of dynamic RAM and local storage 3103 provided by a 130GB disk array. A CD-ROM disk drive 3104 allows instructions to be loaded onto local storage 3103 from a CD-ROM 3105. A Gigabit Ethernet card 3106 facilitates intranet connection to the real time data server 502 and the feeds 503 to 507.

Figure 32

[0140] *Figure 32* details steps carried out by application server 501. At step 3201 the application server 501 is switched on and at step 3202 a question is asked as to whether the necessary instructions are already installed. If this question is answered in the negative then at step 3203 a further question is asked as to whether the instructions should be loaded from the intranet. If this question is answered in the affirmative then at step 3204 the instructions are downloaded from a network 3205. If it is answered in the negative then at step 3206 the instructions are loaded from a CD-ROM 3207.

[0141] Following either of steps 3204 or 3206 the instructions are installed at step 3208. At this point, or if the question asked at step 3202 is answered in the negative, the instructions are executed at step 3209. At step 3210 the application server is switched off. In practice this will happen very infrequently, for example for maintenance.

Figure 33

[0142] *Figure 33* details the contents of memory 3102 during the running of application server 501. An operating system 3301 provides operating system instructions for common system tasks and device abstraction. The Windows™ XP™ operating system is used. Alternatively, a Macintosh™, Unix™ or Linux™ operating system provides similar functionality. Application server instructions 3302 include an application manager 3303 and applications 3304, 3305, 3306, 3307, 3308 and 3309, including an application for each of data feeds 503 to 507. Application data 3310 is data used by the applications 3304 to 3309 and user account data 3311 comprises details of users' accounts, including the validation data information required when starting a session. Live data feed buffers 3312 are buffers for feeds 503 to 507. Other data includes data used by the operating system and application server instructions.

Ex.1079 / IPR2026-00210 / Page 675 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Figure 34

[0143] *Figure 34* details the instructions executed by application manager **3303** at step **3208**. At step **3401** a client logs on successfully to start a session, and at step **3402** the user's application requirements, as stored in his account, are noted. These include the exact data in which the user is interested, for example stocks updates and news stories. At step **3403** a default level of service is selected, which is also retrieved from the user account. Levels of service will be discussed further with reference to *Figure 36*.

[0144] At step **3404** the application server **501** communicates with the client via real time data server **502** by sending messages. The content of these messages is determined by the user's application requirements and the current level of service.

[0145] At step **3405** a question is asked as to whether the session is stalled, which will be indicated to the application server **501** by real time data server **502**, and if this question is answered in the affirmative then at step **3406** a question is asked as to whether the stall has ended. If this question is answered in the affirmative then at step **3407** a selective update of data is performed and control is returned to step **3404**. While the session is stalled, the application server **501** does not send any messages to real time data server **502**.

[0146] If either of the questions asked at steps **3405** or **3406** is answered in the negative, to the effect that the session is not stalled or that the stall has not ended, then at step **3408** a further question is asked as to whether the session has ended. If this question is answered in the affirmative then the session ends at step **3411**. If, however, it is answered in the negative then at step **3409** any change in application requirements received from the client via real time data server **502** is processed, and at step **3410** any received network conditions update is processed to change the level of service, if necessary. Control is then returned to step **3404**.

[0147] Although this process is described here in terms of a single client and session, the skilled user will appreciate that step **3209** involves application server **501** performing these steps for every session.

Figure 35

[0148] *Figure 35* details the selective update performed at step **3407**. At step **3501** all waiting transactional messages are sent. At step **3502** the waiting streamed messages are examined to identify messages that relate to the same data. If any are found, then the older ones are deleted. This means that if during a stall two or more updates have been produced for the same data, as is particularly likely with stock prices, then only the newest update is sent. At step **3503** concatenation of messages is performed if possible. This means that updates for data that have the same priority level could be amalgamated into one message, instead of being sent as individual messages. Finally, at step **3504**, the streamed messages are sent.

[0149] Thus, on a selective update, transactional messages are all sent, whereas only the newest streamed data is sent in order to avoid overloading the network and the client.

Figure 36

[0150] As described with respect to *Figure 27*, the real time data server **502** periodically supplies to application server **501** updates of certain network condition indicators, which in this example comprise the current effective bandwidth, given by the amount of data being sent per second, the amount of data in one or more buffers, and the current round trip time. (In this sense, network includes the real time data server and the client, as well as the Internet, mobile telephony network or LAN, or any other networks in between.) The values of these indicators provide to the application server **502** information regarding the amount of data that can be sent to this client. The applications **3304** to **3309** then use this information to determine how much information of what type should be sent and at what speed.

[0151] *Figure 36* thus illustrates different ways in which the level of service can be changed. Graph **3601** shows how a news application supplies different information dependent upon the effective bandwidth measurement supplied. When the effective bandwidth is low, then only news headlines are supplied. More effective bandwidth allows news summaries to be supplied, while even more allows limited graphics. When the effective bandwidth is very high, the full stories are sent. This is an example of how the level of service sets the type of data sent.

[0152] Graph **3602** shows how a stock prices application could increase the interval between sending messages as the amount of data in the buffers increases. The application can then supersede data that is waiting to be sent with a newer update to the same data, and amalgamate messages if necessary. This is an example of how the level of service sets the amount of data sent.

[0153] Graph **3603** shows how an exchange rate application could stop sending updates altogether if the connection latency is too high, send only some exchange rates if the connection latency is about normal, and send all the rates that the user is interested in if the latency gets very low. This could be valuable if the user has indicated that he does not want to trade on, and is therefore not interested in, certain exchange rates if the latency is known to be above a certain threshold. This is an example of how the amount and type of data sent could be set by the level of service.

[0154] These graphs are only examples of ways in which network condition indicators could be used to vary the level of service. The exact way in which the level of service varies depends upon the application requirements of the user, the particular type of application, the data that the application supplies, and so on. Also, si-

Ex.1079 / IPR2026-00210 / Page 676 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

though these graphs indicate thresholds and linear correlations, the network conditions could be used so that an increase or decrease in a value triggers an increase or decrease in level of service, such that a particular value does not necessarily indicate a particular level of service. The values of two or more network condition indicators could be combined to indicate whether the level of service should increase or decrease. Additionally, the application manager **3303** could make the necessity to consider network conditions more binding on some applications than others.

[0155] Thus MTP provides an additional advantage over other protocols. Because of its management of transmission rate, as described with reference to *Figure 29*, networks with high bandwidth and low latency are used just as effectively as those with low bandwidth and high latency, but if network conditions are better then more information is sent. Thus if, for example, the user of PDA **511** moves into transmission range of WiFi gateway **118** and the PDA detects this and starts using WiFi instead of a telecoms network, not only does the session maintenance described with reference to *Figure 30* enable the session to be continued seamlessly over the higher capacity network, but the user may immediately perceive a higher level of service, depending upon the application being used. Thus the protocol makes the best possible use of low bandwidth and high latency connections, but also provides high bandwidth, low latency users with a high level of service and perceived functionality.

Figure 37

[0156] *Figure 37* details PDA **511**. As described above, this is an example of a terminal that could be used in a system embodying the invention. It includes a CPU **3701** with a clock speed of 370 megahertz (MHz) with memory **3702** being provided by 64 megabytes (MB) of RAM. 256MB of nonvolatile FLASH memory **3703** is provided for program and data storage. Liquid crystal display **3704** is used to display information to the user. Input/output **3705** processes the input of the keys and buttons **513** while audio input/output **3706** provides a microphone and speaker interface for use with the telephone facility. Universal Serial Bus (USB) input/output **3707** is used to connect PDA **511** to another computer, or to the Internet **110** via a wired connection. GPRS/WiFi connection **3708** and GSM connection **3709** enable PDA **511** to connect to wireless networks, while Ethernet card **3710** enables PDA **511** to connect to a wired network, for example via a docking station on a computer.

Figure 38

[0157] *Figure 38* details steps carried out by PDA **511**. At step **3801** PDA **511** is switched on and at step **3802** a question is asked as to whether the real time application instructions are already installed. If this question is answered in the negative then at step **3803** the instructions are downloaded from a network **3804**. The instructions are then installed at step **3805**.

[0158] At this point, or if the question asked at step **3802** is answered in the positive, the instructions are executed at step **3806**. Instructions for other applications on PDA **511** are executed at step **3807**. At step **3808** the PDA is switched off.

Figure 39

[0159] *Figure 39* details the contents of memory **3702** during step **3806**. An operating system **3901** provides operating system instructions for common system tasks and device abstraction. The Windows™ CE™ operating system is used, but a different PDA-suitable operating system could be used. Data transport instructions **3902**, substantially like those described for the real time data server **502** except that there is only a single session, include MTP instructions. Real time application instructions **3903** include individual real time applications such as financial data application **3904**. Application **3904** takes information provided via datagrams into a message queue and displays it on display **3704** according to its interface and user setups. For example, it may provide stocks prices in a grid with news headlines scrolling along the bottom.

[0160] Web browser instructions **3905** and email client instructions **3905** are provided. These applications could also use MTP to communicate via the real time application provider **101**. RTDP **101** can forward information from and to a third party using TCP and from and to a terminal using MTP. This emphasises that the protocol described herein for providing real time data could be used for communication of many types.

[0161] Session data includes segment buffers, priority buffer and state variables as shown for session data **804** in *Figure 9*. Real time application data **3908** is data used by the application instructions **3903** and user account data **3909** comprises the user's password, name, billing details and so on. Other data includes data used by the operating system and other applications.

Figure 40

[0162] Since MTP is a substantially symmetrical protocol there is no need to describe in detail much of the real time application instructions executed at step **3806**. Datagrams are produced, transmitted and received in substantially the same way as the processes described with reference to *Figure 10*. Thus, as shown in *Figure 40*, step **3806** where the client runs the application instructions comprises the following processes running substantially in parallel. Process **4001** transmits datagrams from the client **511** to the real time data server **502**. It comprises two separate processes: datagram preparation **4002** and output buffer processing **4003**. Processes **4002** and **4003** are substantially identical to processes **1002** and **1003** respectively.

Ex.1079 / IPR2026-00210 / Page 677 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

[0163] Process 4004 receives datagrams from the real time data server 502 and comprises three separate processes: datagram reception 4005, transactional datagram processing 4006 and streamed datagram processing 4007. These processes are substantially identical to processes 1005, 1006 and 1007 respectively.

[0164] Process 4008 performs background processing. This is similar to process 1008, except that process 4008 has no step corresponding to step 2707, at which the real time data server 502 informs the application server 501 of the network conditions. The only substantial difference between the client and the server is that the client does not perform a process corresponding to session maintenance 1009.

[0165] An additional difference is that, in general, a session will be requested and terminated by the user of PDA 511.

[0166] Datagram reception process 4005 includes step 4009, at which a resend latency value is calculated, and background processing 4008 includes step 4010, at which a heartbeat rate is negotiated. These steps correspond to steps 1909 and 2702 respectively. Although the facility for these steps exists on both the real time data server 502 and PDA 511, in practice, in this embodiment, it is only PDA 511 that uses them. They are thus described in *Figure 41* and *Figure 42* respectively.

Figure 41

[0167] *Figure 41* illustrates resend latency measurement. This is the delay caused by having to resend a datagram, as opposed to the connection latency which is the delay caused by the network. Packets sent across the Internet 110 are not guaranteed to arrive, which is why an additional protocol like MTP must be used to ensure eventual delivery. When an MTP datagram gets "lost", meaning that it is not acknowledged, it will be resent. The data it contains, therefore, is more out-of-date than it would have been had it arrived first time. This resend latency is calculated at step 4009.

[0168] In *Figure 41* the original datagram 4101 is transmitted and fails to be delivered. After a time, either through a lack of acknowledgement or a negative acknowledge, the real time data server 502 will resend the datagram. The resent datagram 4102 is also lost. A third attempt 4103 is successful.

[0169] Each datagram contains an elapsed time field 4104. In datagram 4101 this is set to zero. In datagram 4102 it is the difference between the transmission time of datagram 4102 and the transmission time of datagram 4101; similarly for datagram 4103. Thus, for example, the elapsed time field for datagram 4103 is 421 milliseconds.

[0170] Thus a first data packet or datagram is transmitted from a first station, such as server 502, over a network to create a first transmission with the intention of said first transmission being received at a second station, such as PDA 511. The server 502 re-transmits the first data packet to PDA 511 to create a second transmission. The second transmission of the first data packet includes latency information, such as the elapsed time field, indicating the time between the first transmission and the second transmission, and PDA 511 processes the latency information to determine a resend latency measurement.

[0171] When a resent datagram is received the resend latency is recalculated using a smoothing filter on the elapsed time. If no datagrams are received at all then the resend latency is gradually increased. This occurs in this embodiment once a heartbeat period has passed with no receipt of datagrams. However, receipt of any datagram, including transactional datagrams and empty streamed datagrams, will at this point decrease the latency, since it implies that the reason for non-receipt of streamed data may be that there is no data to send, and thus the last received updates may still be current.

[0172] The resend latency is added to the connection latency to give the application latency. This is the actual time delay of the data displayed to the user on PDA 511. Thus the timeliness of the data, according to a function of the length of time taken to reach the client and the possible number of resends it required, is displayed to the user to allow him to make a decision regarding whether or not to use the data. Optionally, when the application latency falls below a certain threshold the screen may "grey out" and transactions may be suspended.

Figure 42

[0173] *Figure 42* details step 4010, at which the PDA 511 negotiates a new heartbeat rate with real time data server 502. The heartbeat rate is the maximum interval that is allowed to pass without sending data, both by the server and by the client: if no data has been sent at the end of this interval then an empty streamed datagram is sent. In this embodiment, this is combined with the connection latency measurement by sending the latency measurement datagram at intervals which are the same as the heartbeat rate. If the server does not receive any data from the client for an interval substantially equal to twice the heartbeat interval, then the session will stall. The client, however, does not stall a session on non-receipt of data, but continues to send data, or heartbeats if there is no data. A heartbeat is in this embodiment usually a latency-measurement datagram, but could be an empty datagram with the KAL field 1213 set.

[0174] Since latency measurements are sent at the heartbeat rate, the latency is more accurate when the heartbeat is faster. This means that when the user is, for example, trading, the heartbeat should be fast, whereas when he is browsing news stories the heartbeat should be slow. Thus the heartbeat negotiation is triggered by events that occur when the PDA 511 switches applications, minimises or maximises applications or enters a particular state in an application.

[0175] At step 4201 a new heartbeat rate is requested

Ex.1079 / IPR2026-00210 / Page 678 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

by sending a datagram that has SYN field 1202 set and a number in acknowledgement number field 1212, but does not have ACK field 1203 set. At step 4202 a question is asked as to whether the heartbeat rate has been agreed by receiving an acknowledgement of this datagram. If this question is answered in the negative then the heartbeat rate is not changed. Alternatively, if the heartbeat rate is agreed, the rate is changed at step 4203.

[0176] Associated with this is the possibility that the client may at any time change its application requirements. For example, on minimising of the display of stock prices the client may, using a transactional datagram, change its application requirements to stop the transmission of stock prices. On using the telephone, which requires as much bandwidth as possible, the client may change its application requirements to cease all transmission of streamed data. When the user returns to the display of stocks then the application requirements can be changed again to indicate that the default requirements apply. However, even when no streamed data is being sent, the client and server continue to send latency measurements at the agreed heartbeat rate. This indicates not only that the connection is still active but allows an immediate display of latency when the user returns to the display of streamed data.

Claims

1. A network data transmission method, comprising the steps of:

   transmitting a first data packet from a first station over a network to create a first transmission with the intention of said first transmission being received at a second station;
   re-transmitting said first data packet from said first station to said second station to create a second transmission, wherein
   said second transmission of said first data packet includes latency information indicating the time between said first transmission and said second transmission; and, at said second station
   processing said latency information to determine a resend latency measurement.

2. A method according to claim 1, wherein said first station retransmits said first data packet if an acknowledgement of said first data packet has not been received from said second station within a specified period of time.

3. A method according to claim 1, wherein said first station retransmits said first data packet if said second station has transmitted an indication that said first data packet has not been received.

4. A method according to claim 1, further including the steps of, at said second station:

   identifying a condition to the effect that an anticipated transmission has not been received from said first station, and
   increasing the measurement of said resend latency.

5. A method according to claim 1, further including the steps of, at said second station:

   receiving a data packet from said first station that does not contain any data; and
   decreasing the measurement of said resend latency.

6. A method according to claim 1, wherein said network includes a radio network.

7. A method according to claim 1, wherein said first station is a server.

8. A method according to claim 1, wherein said second station is one of a plurality of terminals.

9. A method according to claim 8, wherein said terminal is a mobile terminal or a radio device.

10. A radio network data transmission method, comprising the steps of:

    transmitting a first data packet from a server over a radio network to create a first transmission with the intention of said first transmission being received by a mobile terminal;
    re-transmitting said first data packet from said server to said terminal to create a second transmission if an acknowledgement of said first transmission has not been received by said server, wherein
    said second transmission includes latency information indicating the time between said first transmission and said second transmission; and, at said terminal
    processing said latency information to determine a resend latency measurement.

11. A server configured to communicate with at least one terminal over a network, said server configured to:

    transmit a first data packet to a terminal to create a first transmission with the intention of said first transmission being received by said terminal;
    identifying a condition to the effect that said first transmission has not been received as intended;
    calculating latency information indicating a measurement of time between said first trans-

Ex.1079 / IPR2026-00210 / Page 679 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

mission and a proposed re-transmission;
re-transmitting said first data packet to said terminal to create a second transmission, wherein said latency information is included in said second transmission, such that said latency information may be processed by said terminal to determine a measurement of re-send latency.

12. A server according to claim 11, configured to communicate with a plurality of terminals.

13. A server configured to receive data over a network from at least one terminal, said server configured to:

receive a first data packet that includes latency information indicating the time between a first transmission of said first data packet and the received transmission of said first data packet, and
processing said latency information to determine a resend latency measurement.

14. A server according to claim 13 configured to communicate with a plurality of terminals.

15. A terminal configured to communicate with a server over a network, said terminal configured to:

transmit a first data packet to said server to create a first transmission with the intention of said first transmission being received by said server;
identify a condition to the effect that said first transmission has not been received as intended;
calculate latency information indicating a measurement of time between said first transmission and a proposed re-transmission;
re-transmitting said first data packet to said server to create a second transmission, wherein
said latency information is included in said second transmission, such that said latency information may be processed by said server to determine a measurement of re-send latency.

16. A terminal according to claim 15, configured as a mobile terminal or a radio device.

17. A terminal configured to receive data over a network from a server, said terminal configured to:

receive a first data packet that includes latency information indicating the time between a first transmission of said first data packet and the received transmission of said first data packet, and
processing said latency information to determine a resend latency measurement.

18. A terminal according to claim 17, embodied as a mobile terminal or a radio device.

19. Instructions executable by a network of computers or programmable data processing devices such that when executing said instruction stations connection to said network will perform the steps of:

transmitting a first data packet from a first station over said network to create a first transmission with the intention of said first transmission being received at a second station; and
re-transmitting said first data packet from said first station to said second station over said network to create a second transmission, wherein
said second transmission of said first data packet includes latency information indicating the time between said first transmission and said second transmission; and, at said second station
processing said latency information to determine a resend latency measurement.

20. Instructions executable by stations connected over a network such that, when executing said instructions, said stations will perform the steps of:

transmitting a first data packet from a first station over said network to create a first transmission with the intention of said first transmission being received by a second station;
re-transmitting said first data packet from said first station to said second station to create a second transmission if an acknowledgement of said first transmission has not been received by said first station, wherein
said second transmission includes latency information indicating the time between said first transmission and said second transmission; and, at said second station
processing said latency information to determine a resend latency measurement.

21. A computer readable medium having machine readable instructions executable by a computer such that when executing said instructions a computer will perform the steps of

transmitting a first data packet to a networked device to create a first transmission with the intention of said first transmission being received by said networked device;
receiving an indication to the effect that said first transmission has not been received as intended;
calculating latency information indicating a measurement of latency between said first transmission and a proposed re-transmission;
re-transmitting said first data packet to said networked device to create a second transmission,

Ex.1079 / IPR2026-00210 / Page 680 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

wherein
said latency information is included in said second transmission, such that said latency information may be processed by said networked device to determine a measurement of re-send latency.

22. A computer readable medium having machine-readable instructions executable by a computer such that when executing said instructions a computer will perform the steps of

receiving a first data packet that includes latency information indicating the time between a first transmission of said first data packet and the received transmission of said first data packet, and
processing said latency information to determine a resend latency measurement.

Ex.1079 / IPR2026-00210 / Page 681 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

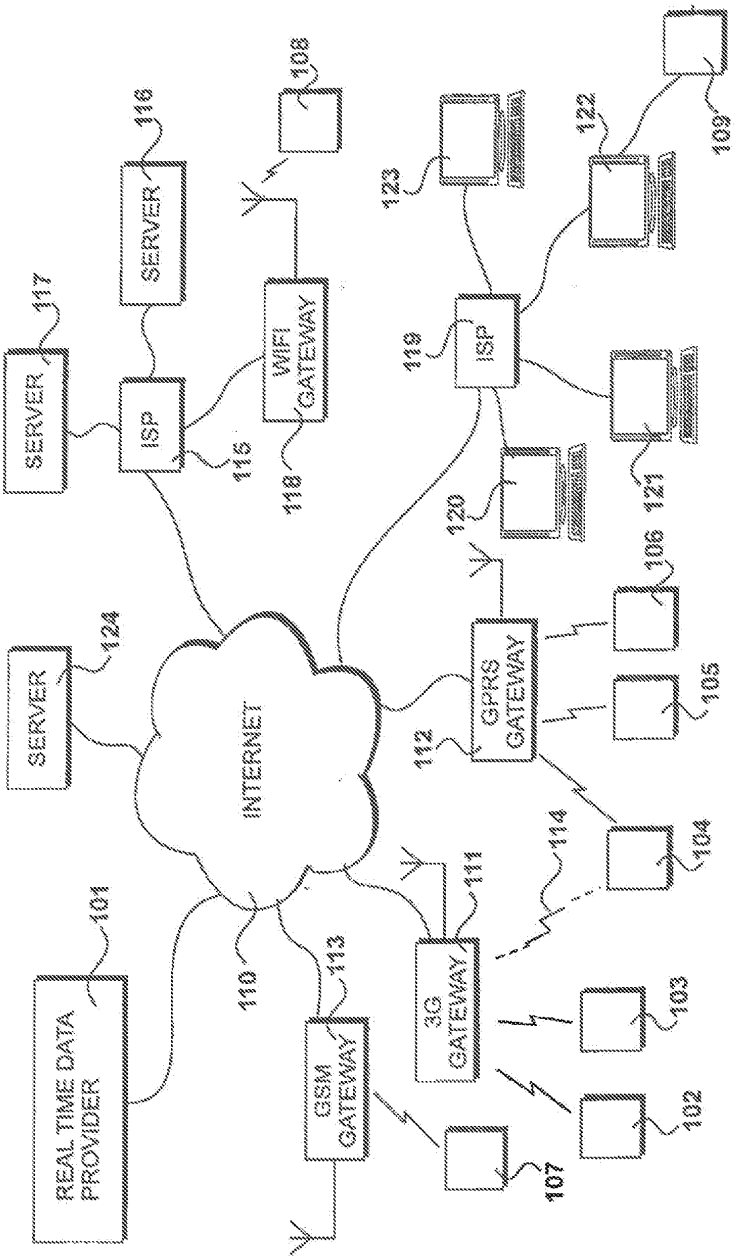


Figure 1

Ex.1079 / IPR2026-00210 / Page 682 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Figure 2

Ex.1079 / IPR2026-00210 / Page 683 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Figure 3

[PRIOR ART]

Ex.1079 / IPR2026-00210 / Page 684 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Figure 4 [PRIOR ART]

Ex.1079 / IPR2026-00210 / Page 685 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Figure 5

Ex.1079 / IPR2026-00210 / Page 686 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

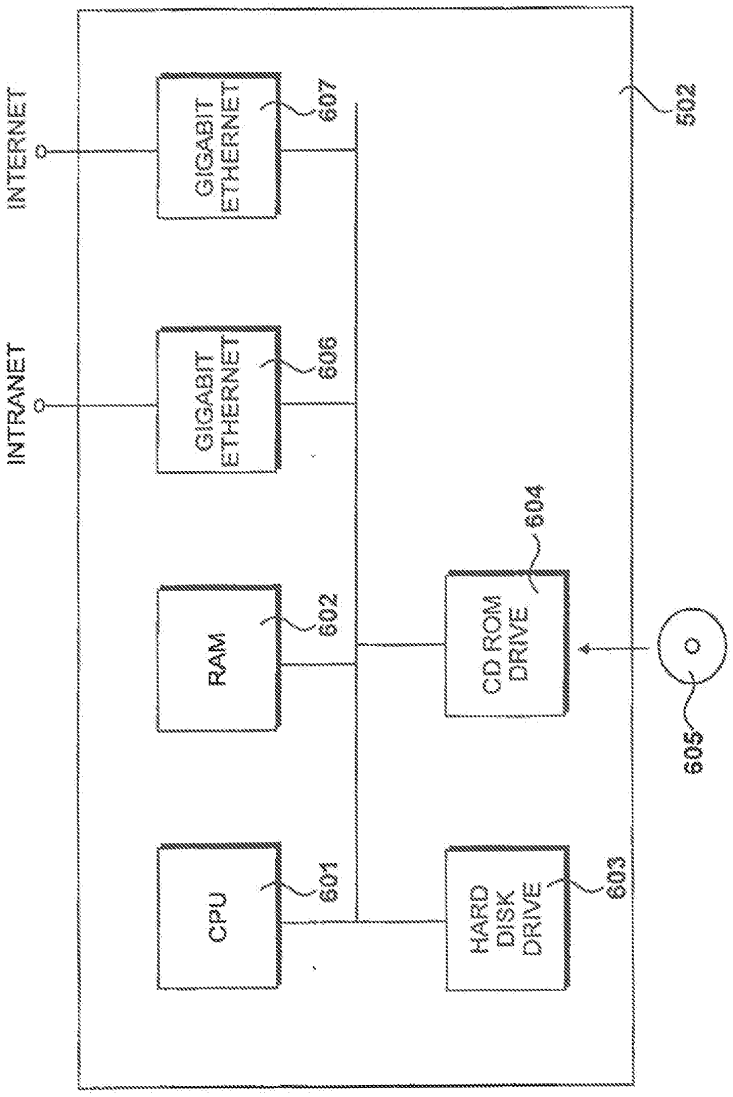

INTERNET
INTRANET
GIGABIT ETHERNET
607
GIGABIT ETHERNET
606
RAM
602
CD ROM DRIVE
604
605
CPU
601
HARD DISK DRIVE
603
602

Figure 6

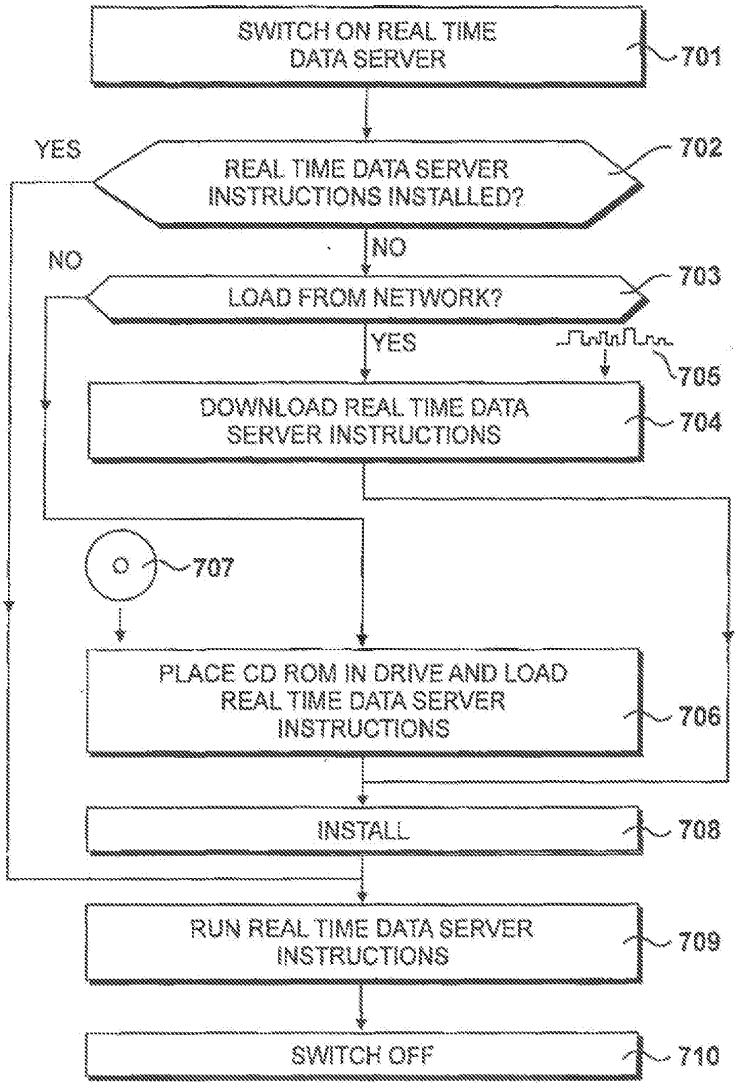


Figure 7

Ex.1079 / IPR2026-00210 / Page 688 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

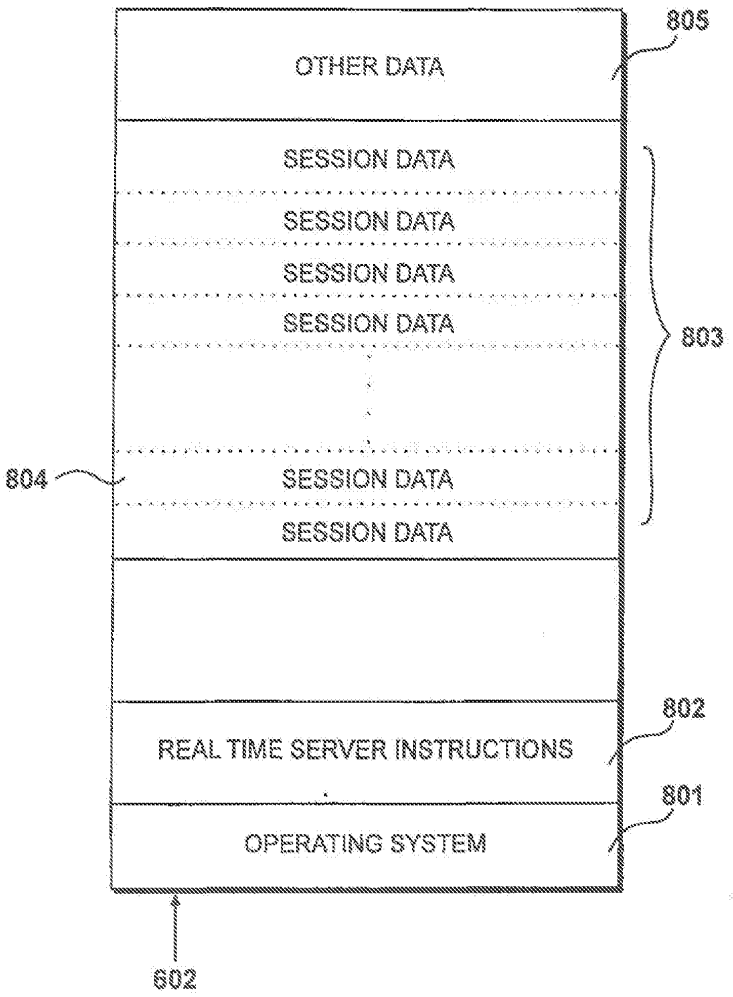


Figure 8

Ex.1079 / IPR2026-00210 / Page 689 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Figure 9

Ex.1079 / IPR2026-00210 / Page 690 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

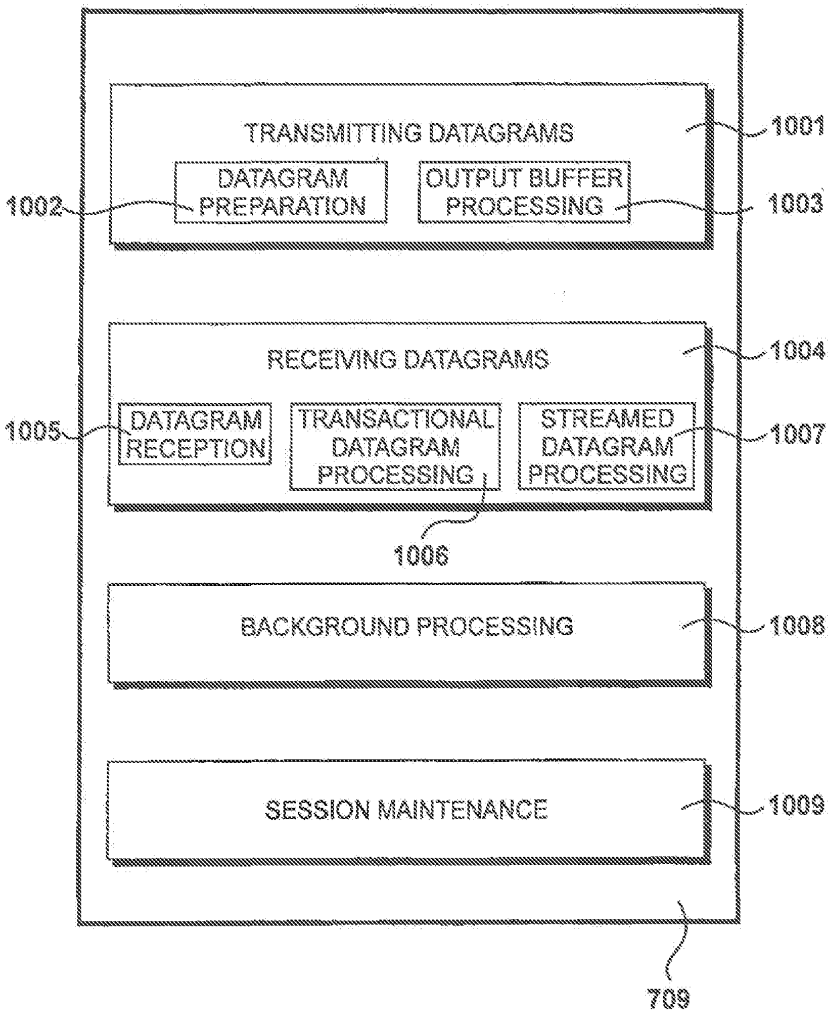


Figure 10

Ex.1079 / IPR2026-00210 / Page 691 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

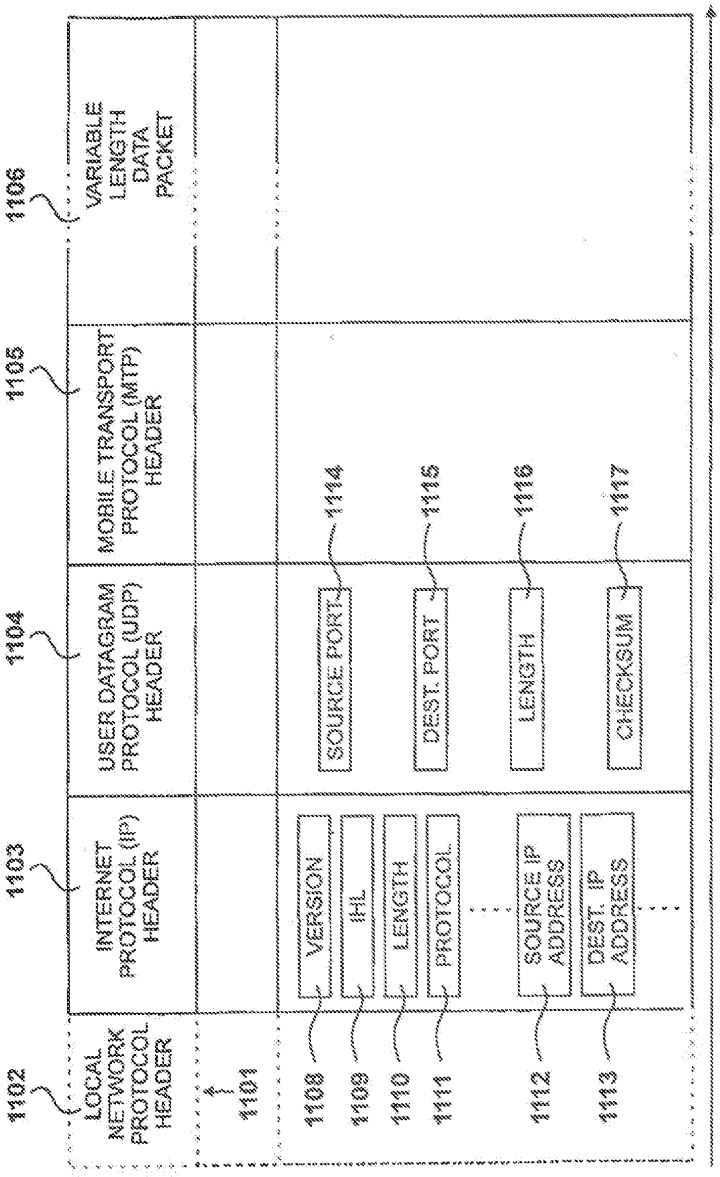


Figure 11

Ex.1079 / IPR2026-00210 / Page 692 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

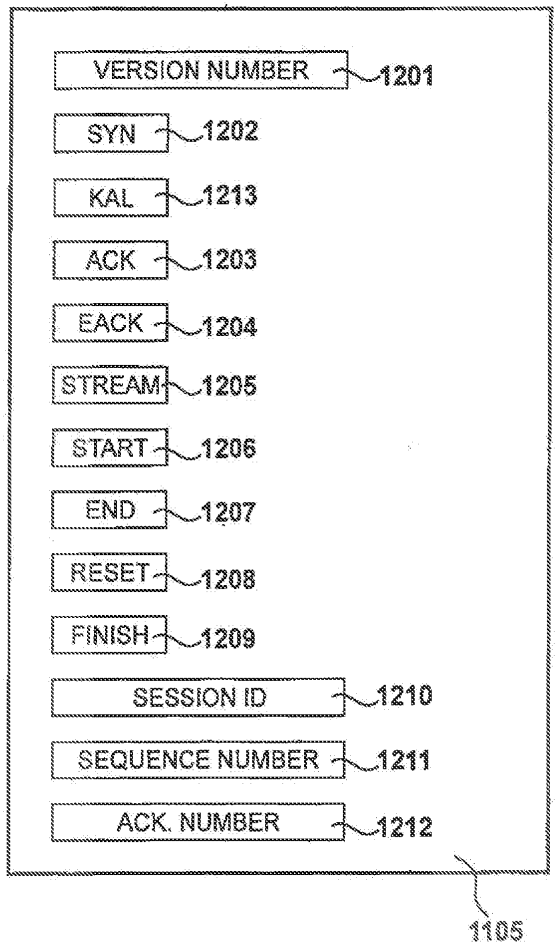


Figure 12

Ex.1079 / IPR2026-00210 / Page 693 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

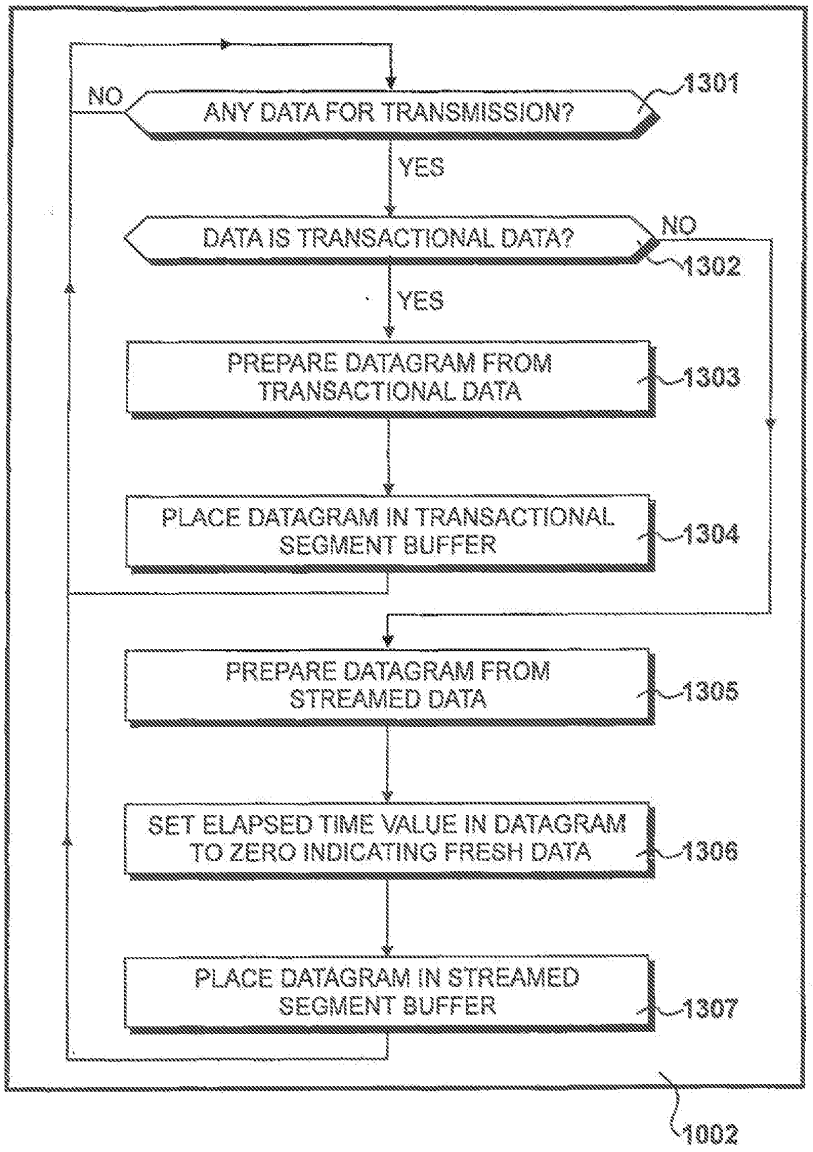


Figure 13

Ex.1079 / IPR2026-00210 / Page 694 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

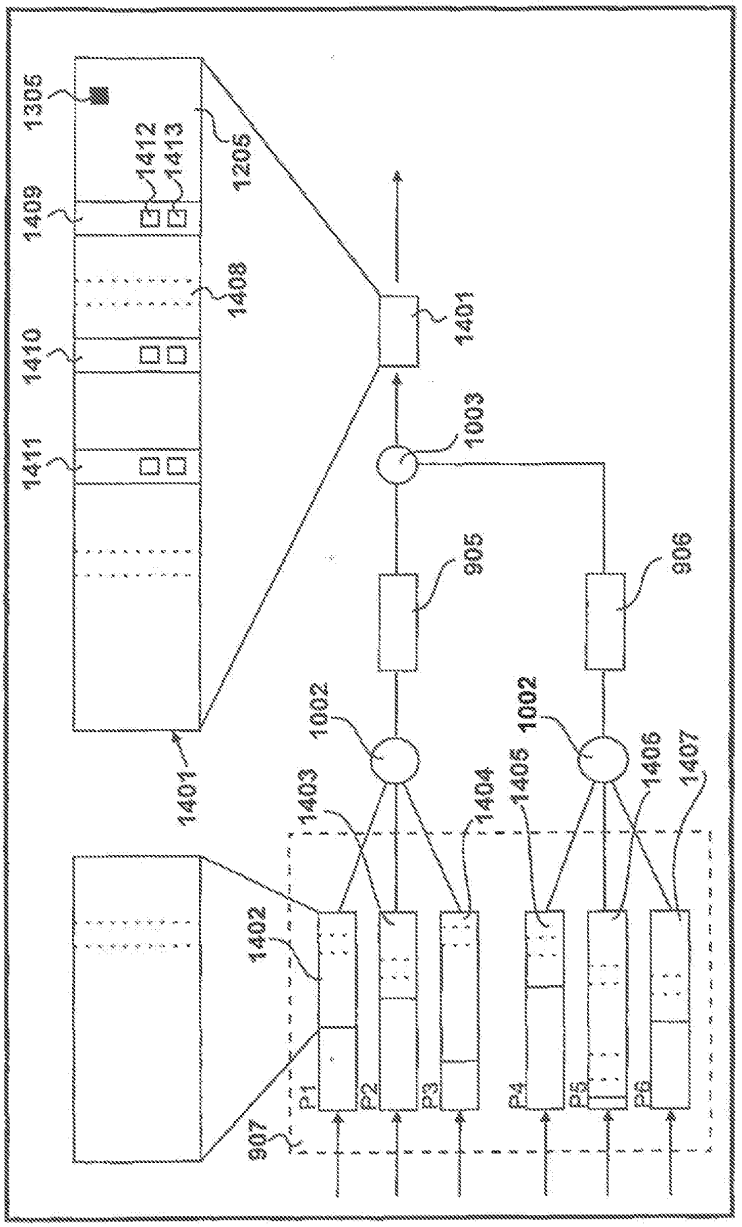


Figure 14

Ex.1079 / IPR2026-00210 / Page 695 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

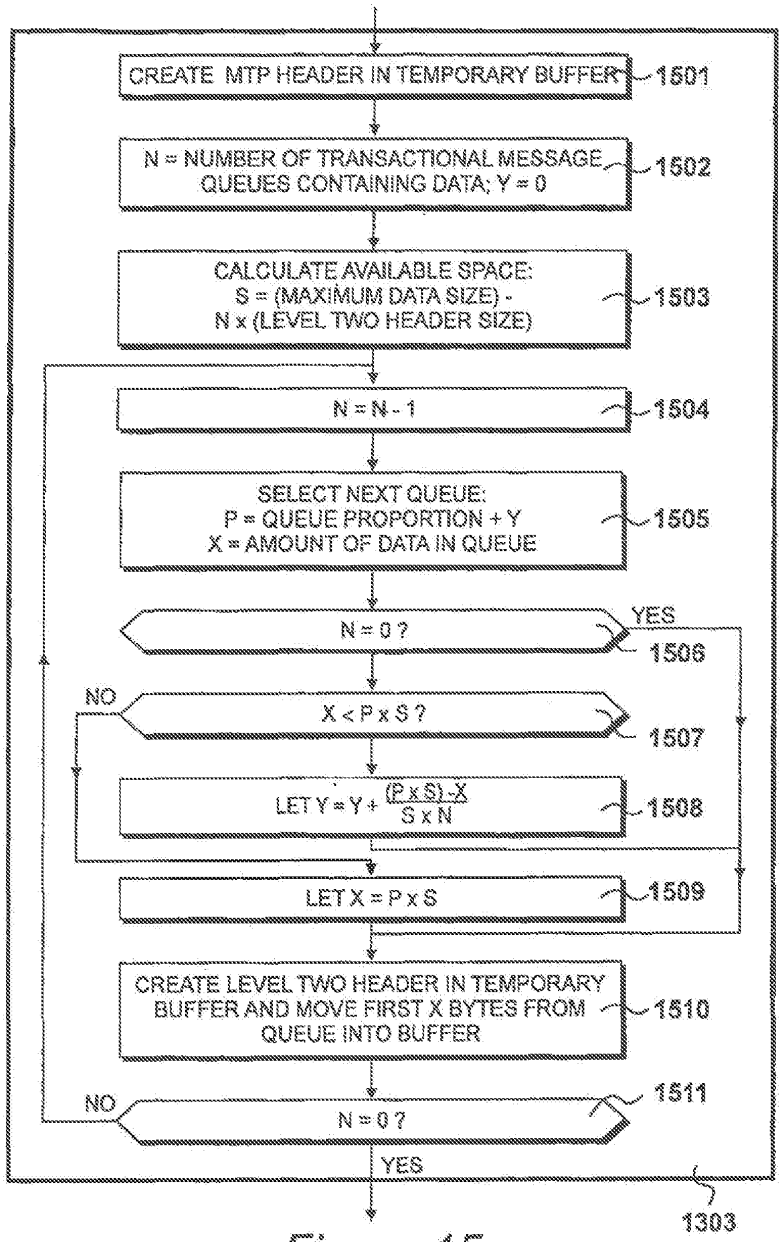


Figure 15

Ex.1079 / IPR2026-00210 / Page 696 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

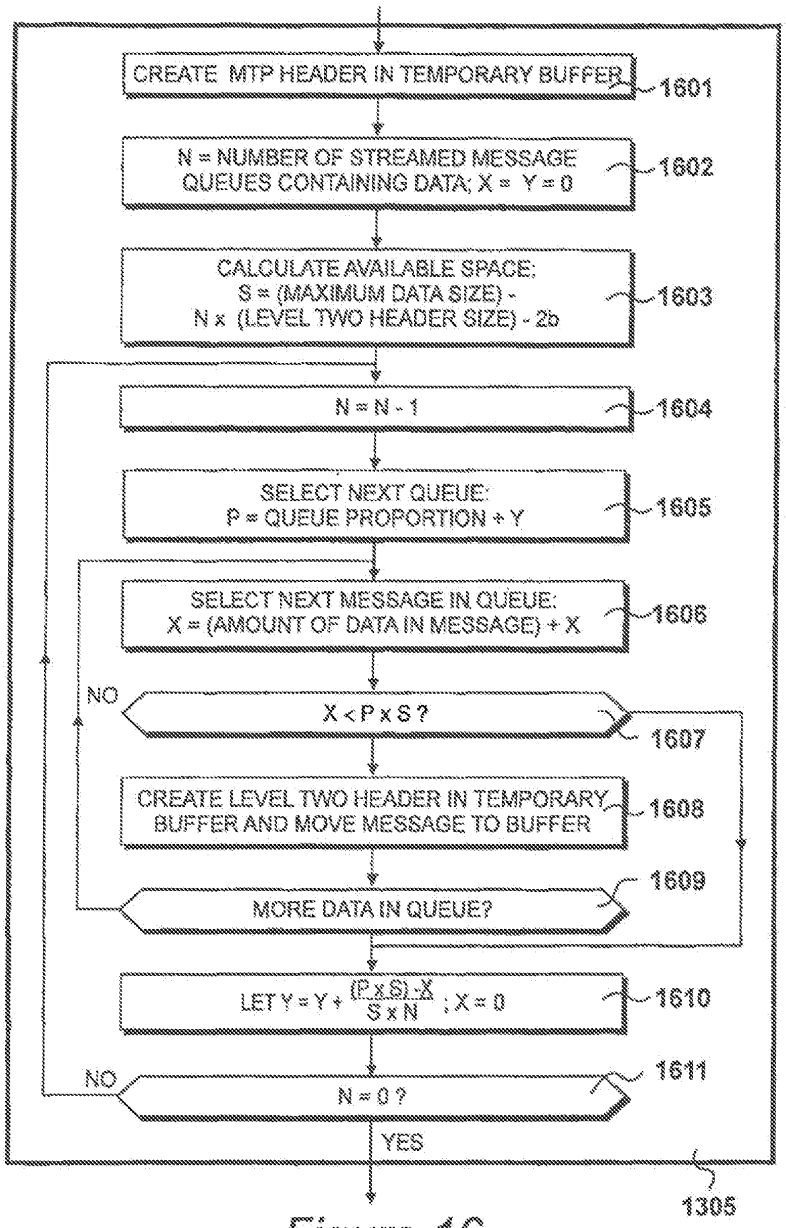


Figure 16

Ex.1079 / IPR2026-00210 / Page 697 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

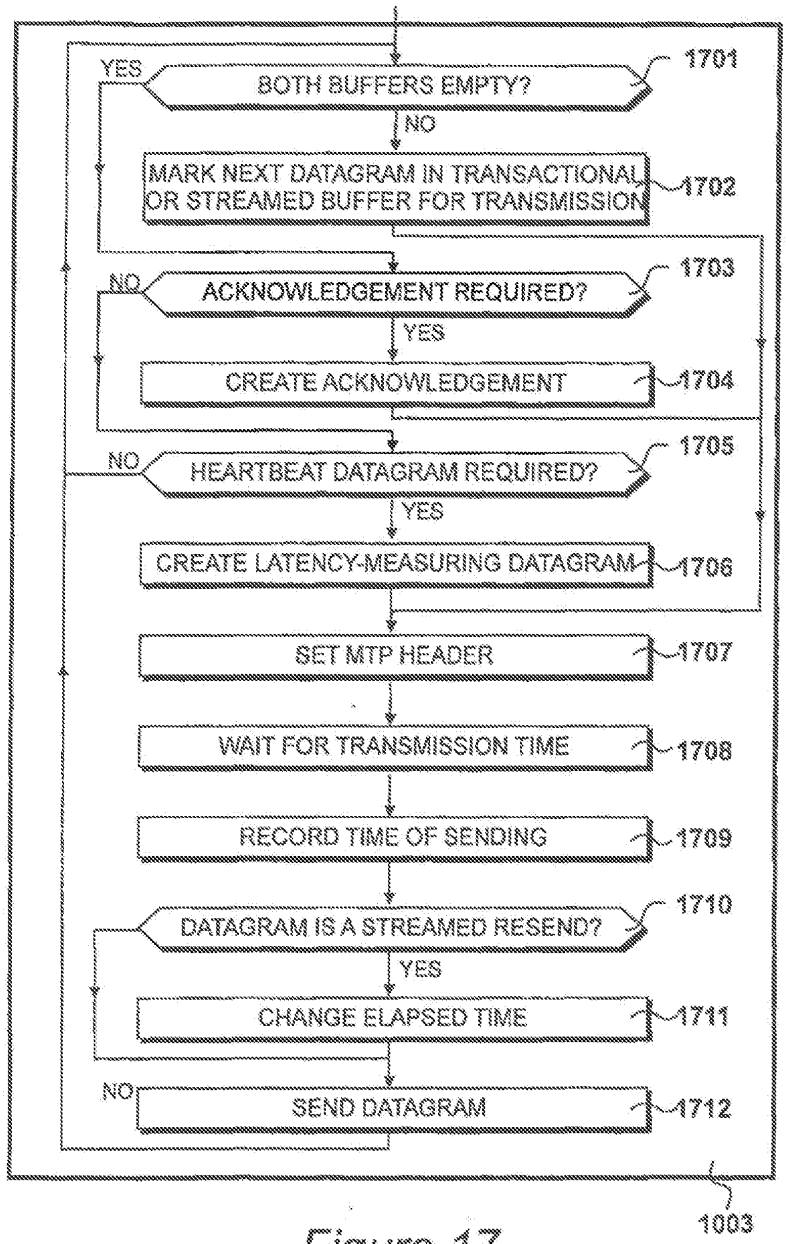


Figure 17

Ex.1079 / IPR2026-00210 / Page 698 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

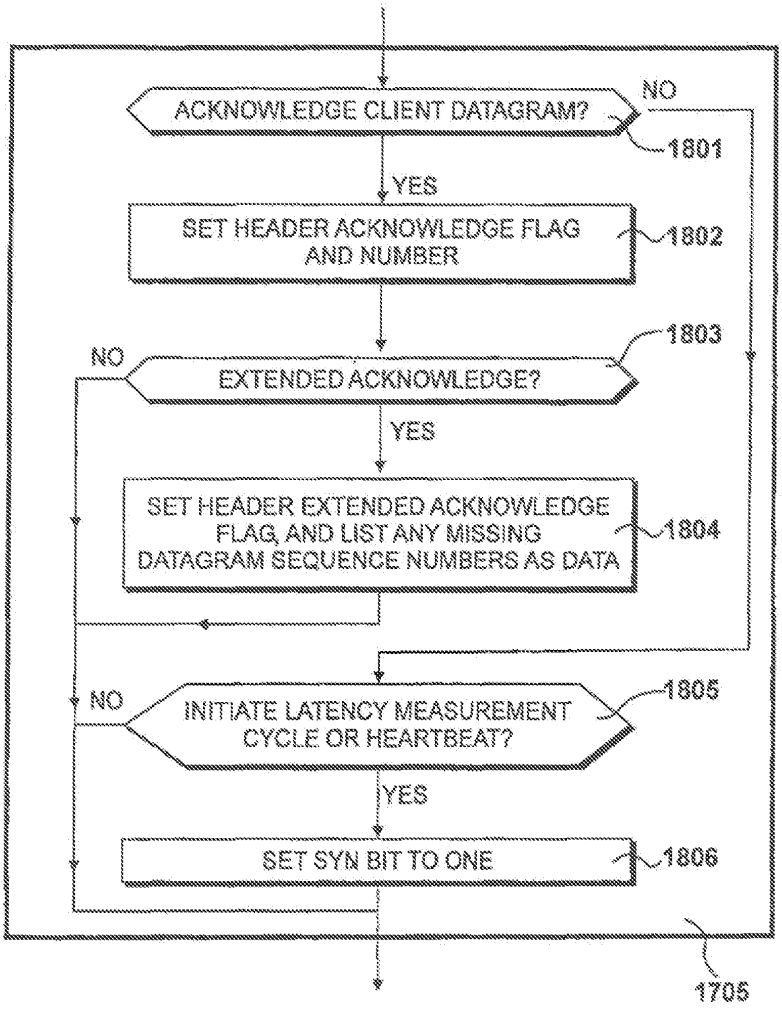

ACKNOWLEDGE CLIENT DATAGRAM?
NO
1801
YES
SET HEADER ACKNOWLEDGE FLAG AND NUMBER
1802
1803
NO
EXTENDED ACKNOWLEDGE?
YES
SET HEADER EXTENDED ACKNOWLEDGE FLAG, AND LIST ANY MISSING DATAGRAM SEQUENCE NUMBERS AS DATA
1804
NO
INITIATE LATENCY MEASUREMENT CYCLE OR HEARTBEAT?
1805
YES
SET SYN BIT TO ONE
1806
1705

Figure 18

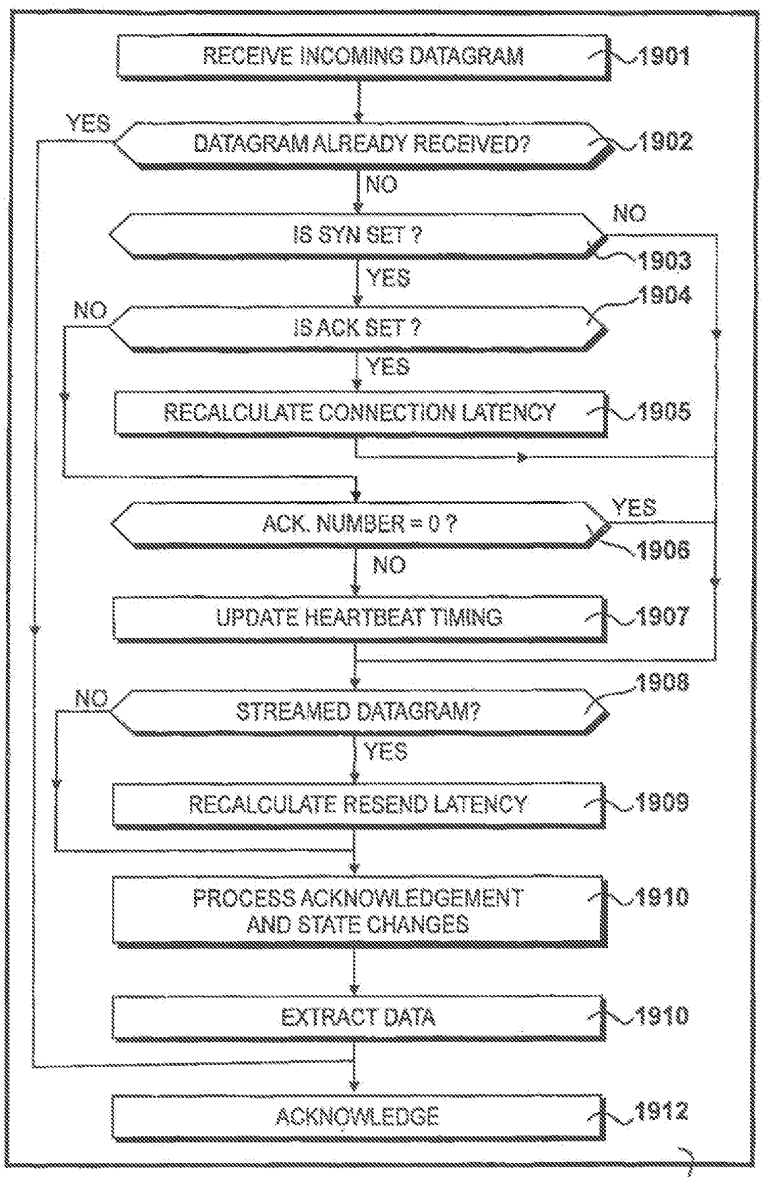

RECEIVE INCOMING DATAGRAM
1901
YES
DATAGRAM ALREADY RECEIVED?
1902
NO
NO
IS SYN SET ?
1903
YES
1904
NO
IS ACK SET ?
YES
RECALCULATE CONNECTION LATENCY
1905
YES
ACK. NUMBER = 0 ?
1906
NO
UPDATE HEARTBEAT TIMING
1907
1908
NO
STREAMED DATAGRAM?
YES
RECALCULATE RESEND LATENCY
1909
PROCESS ACKNOWLEDGEMENT AND STATE CHANGES
1910
EXTRACT DATA
1910
ACKNOWLEDGE
1912
1005

Figure 19

REAL TIME DATA SERVER 502
CLIENT 611
TRANSMIT
905
TAG SET
1202
TRANSMIT DATAGRAM
2004
A
2001
2002
2003
RECEIVE
2005
B
COPY TAG
2006
2007
TRANSMIT
RECEIVE
1202
TRANSMIT DATAGRAM
C
2008
1203
1203
TWO-WAY LATENCY = A + B + C
ONE-WAY LATENCY = A + B + C / 2
2006
FILTERED LATENCY = (1-K) LATENCY + K. FILTERED LATENCY
WHERE K = ADAPTIVE FILTER COEFFICIENT
2008

Figure 20

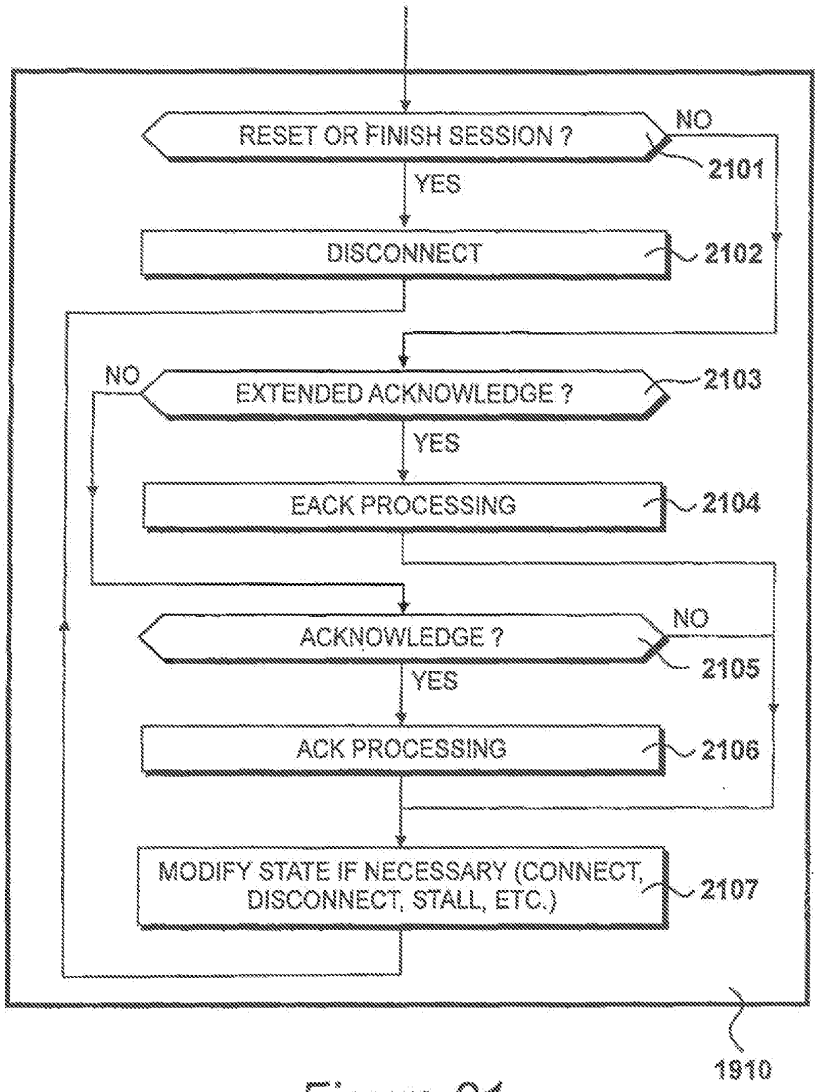

RESET OR FINISH SESSION ?
NO
2101
YES
DISCONNECT
2102
NO
EXTENDED ACKNOWLEDGE ?
2103
YES
EACK PROCESSING
2104
ACKNOWLEDGE ?
NO
2105
YES
ACK PROCESSING
2106
MODIFY STATE IF NECESSARY (CONNECT, DISCONNECT, STALL, ETC.)
2107
1910

Figure 21

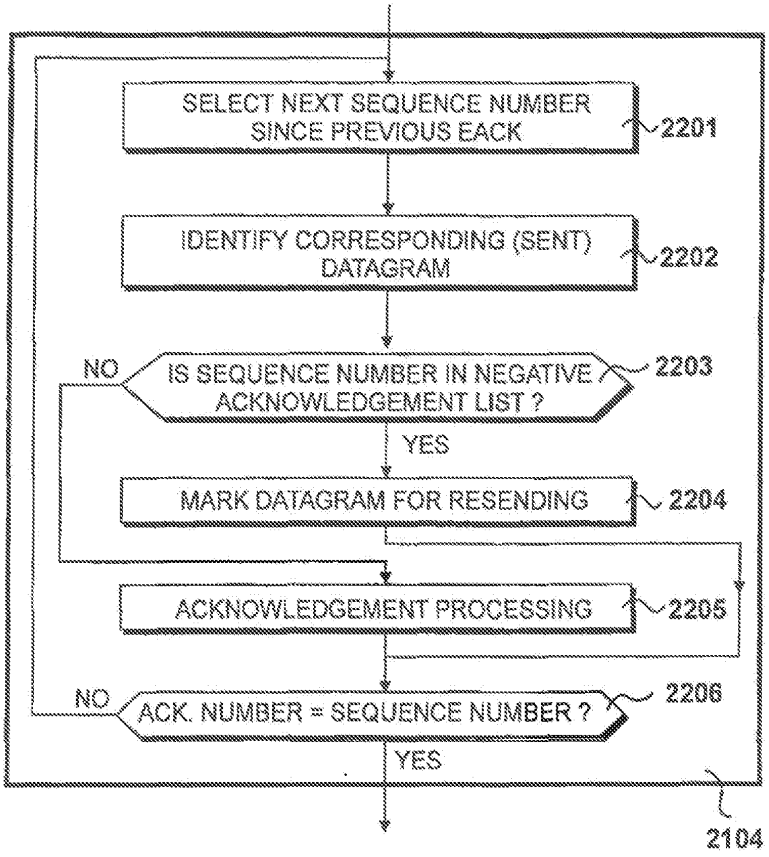


Figure 22

Ex.1079 / IPR2026-00210 / Page 703 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

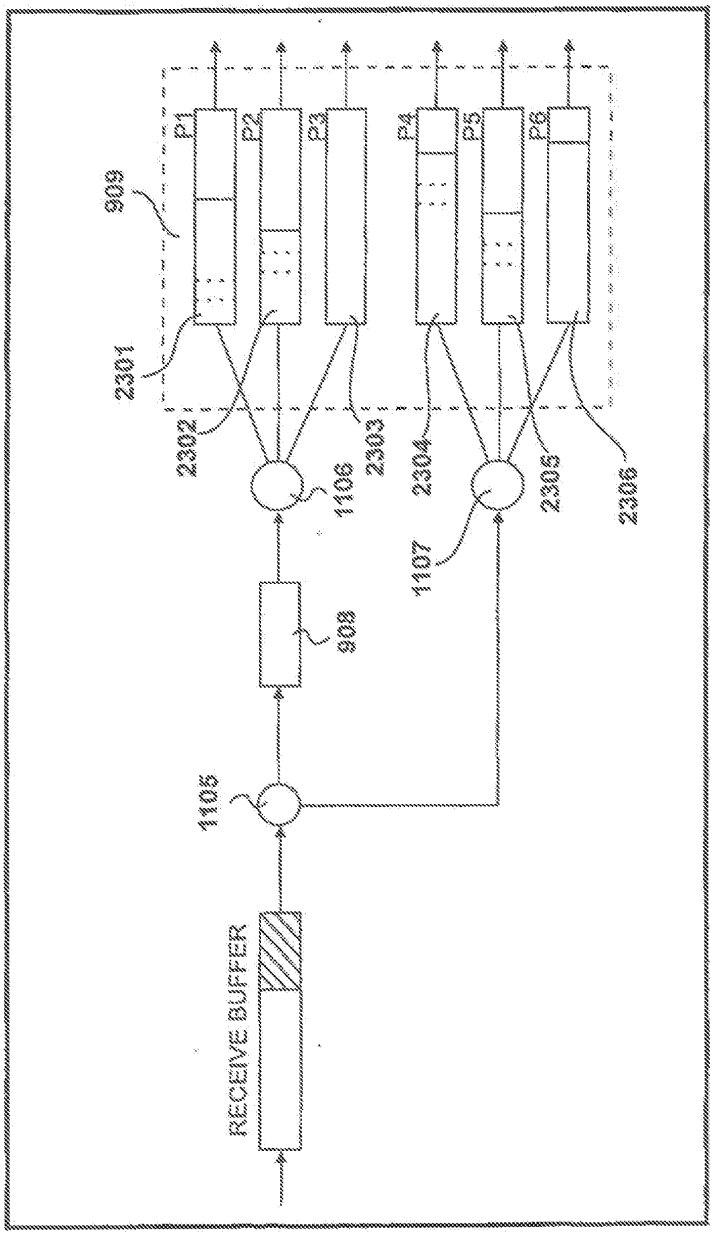

P1
P2
P3
P4
P5
P6
909
2301
2302
2303
2304
2305
2306
1106
1107
908
1106
RECEIVE BUFFER

Figure 23

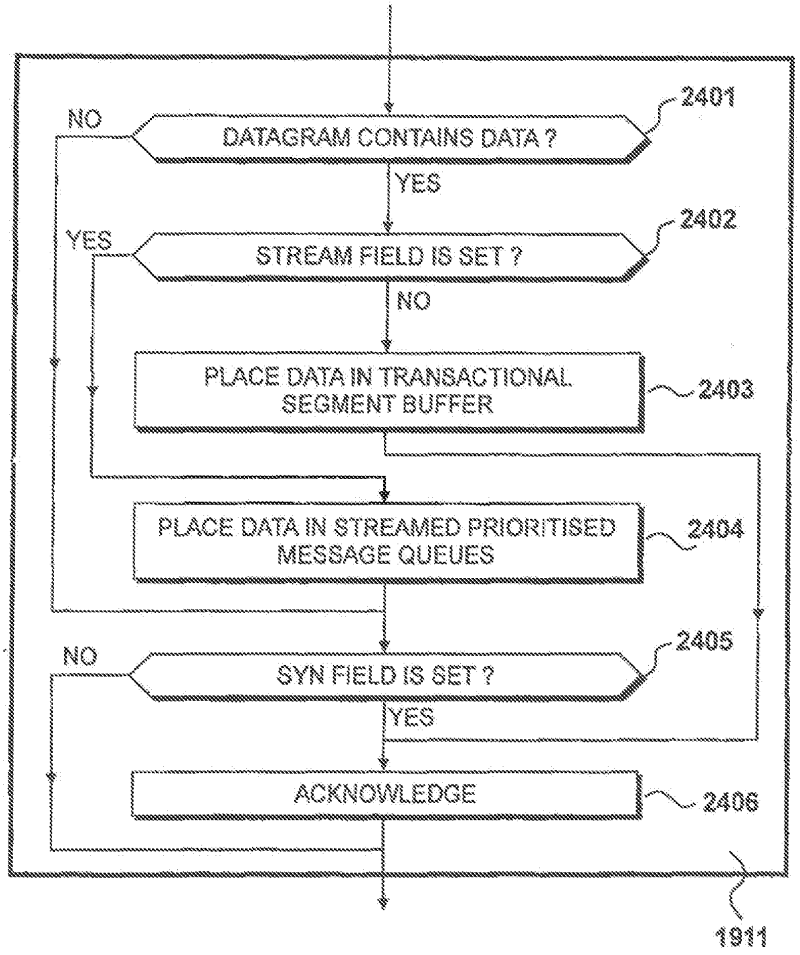


Figure 24

Ex.1079 / IPR2026-00210 / Page 705 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

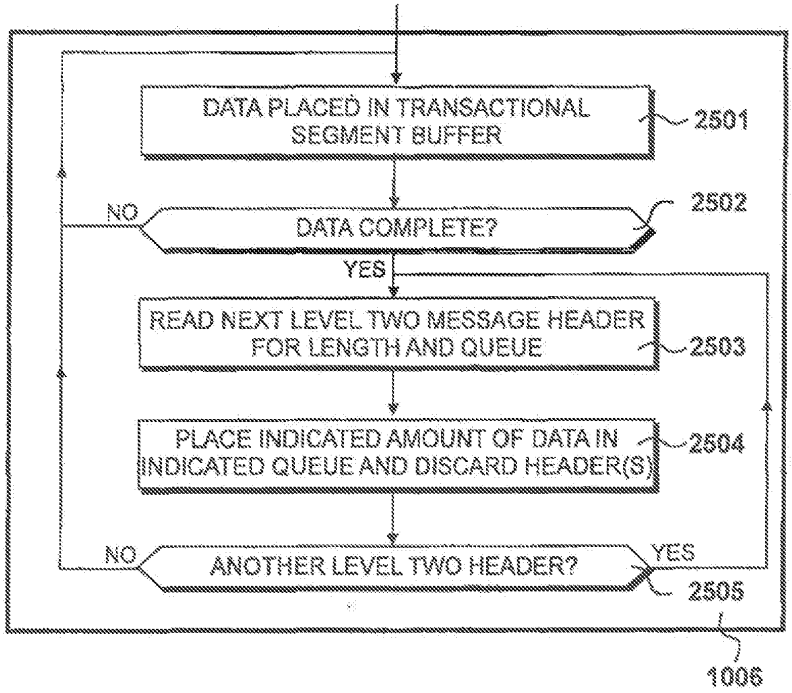

DATA PLACED IN TRANSACTIONAL SEGMENT BUFFER
2501
NO
DATA COMPLETE?
2502
YES
READ NEXT LEVEL TWO MESSAGE HEADER FOR LENGTH AND QUEUE
2503
PLACE INDICATED AMOUNT OF DATA IN INDICATED QUEUE AND DISCARD HEADER(S)
2504
NO
ANOTHER LEVEL TWO HEADER?
YES
2505
1006

Figure 25

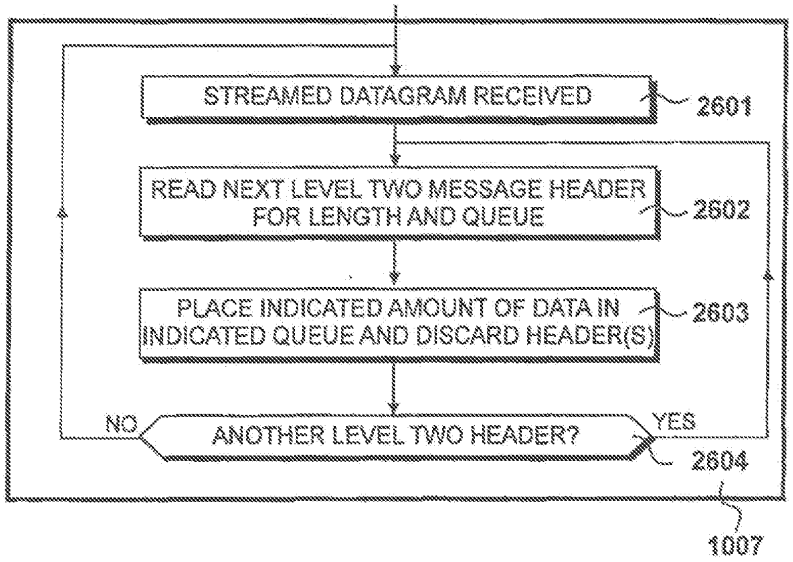

STREAMED DATAGRAM RECEIVED
2601
READ NEXT LEVEL TWO MESSAGE HEADER FOR LENGTH AND QUEUE
2602
PLACE INDICATED AMOUNT OF DATA IN INDICATED QUEUE AND DISCARD HEADER(S)
2603
NO
ANOTHER LEVEL TWO HEADER?
YES
2604
1007

Figure 26

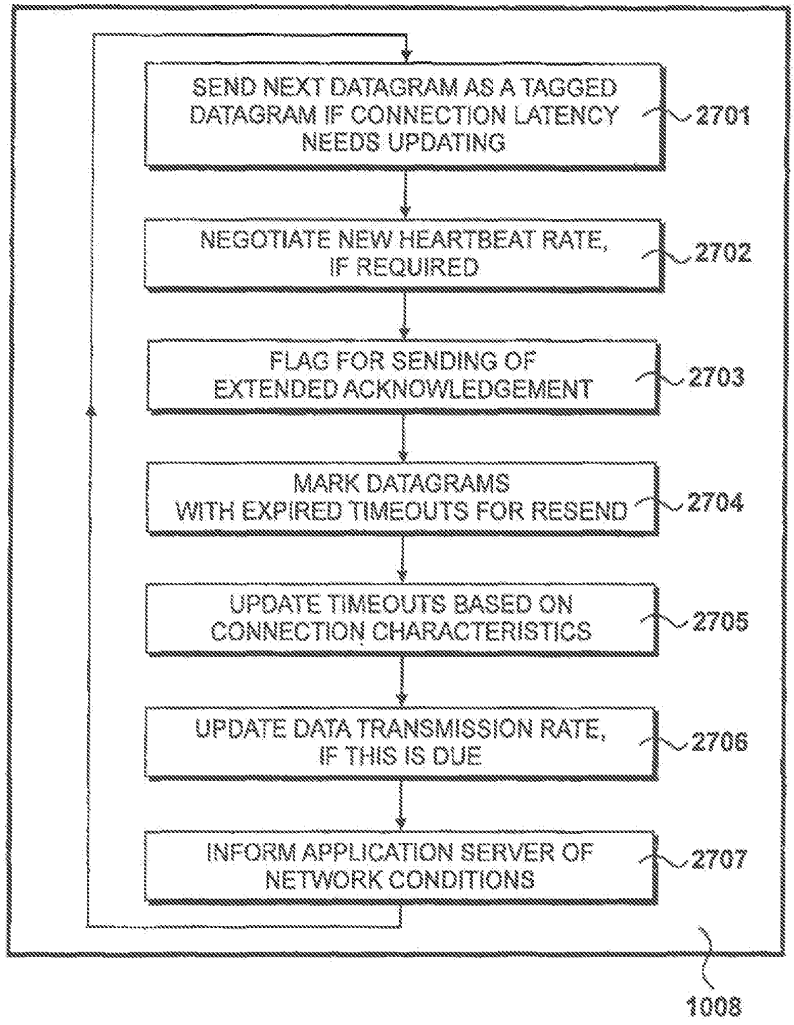


Figure 27

Ex.1079 / IPR2026-00210 / Page 708 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

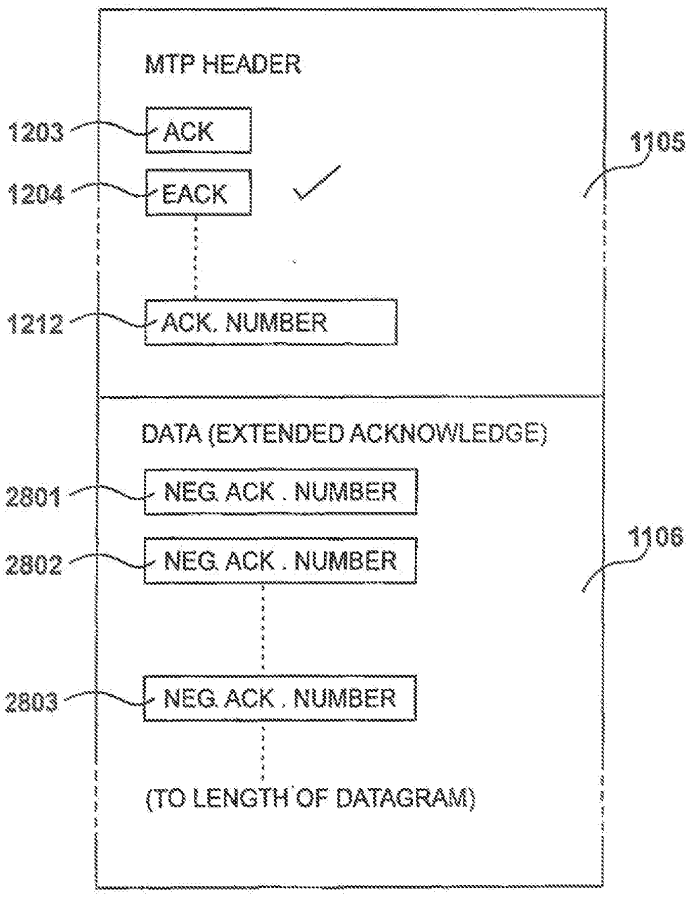

MTP HEADER
1203
ACK
1204
EACK
1105
1212
ACK. NUMBER
DATA (EXTENDED ACKNOWLEDGE)
2801
NEG. ACK . NUMBER
2802
NEG. ACK . NUMBER
1106
2803
NEG. ACK . NUMBER
(TO LENGTH OF DATAGRAM)

Figure 28

PDA
511
REAL TIME
DATA PROVIDER
101
1102
1102
2811
2812
2813
2814
2815
2816
2817
2818
2819
2820
2821
2822
2823
2824
2825
2826
2827
2828
ACK
ACK
ACK
EACK

Figure 28A

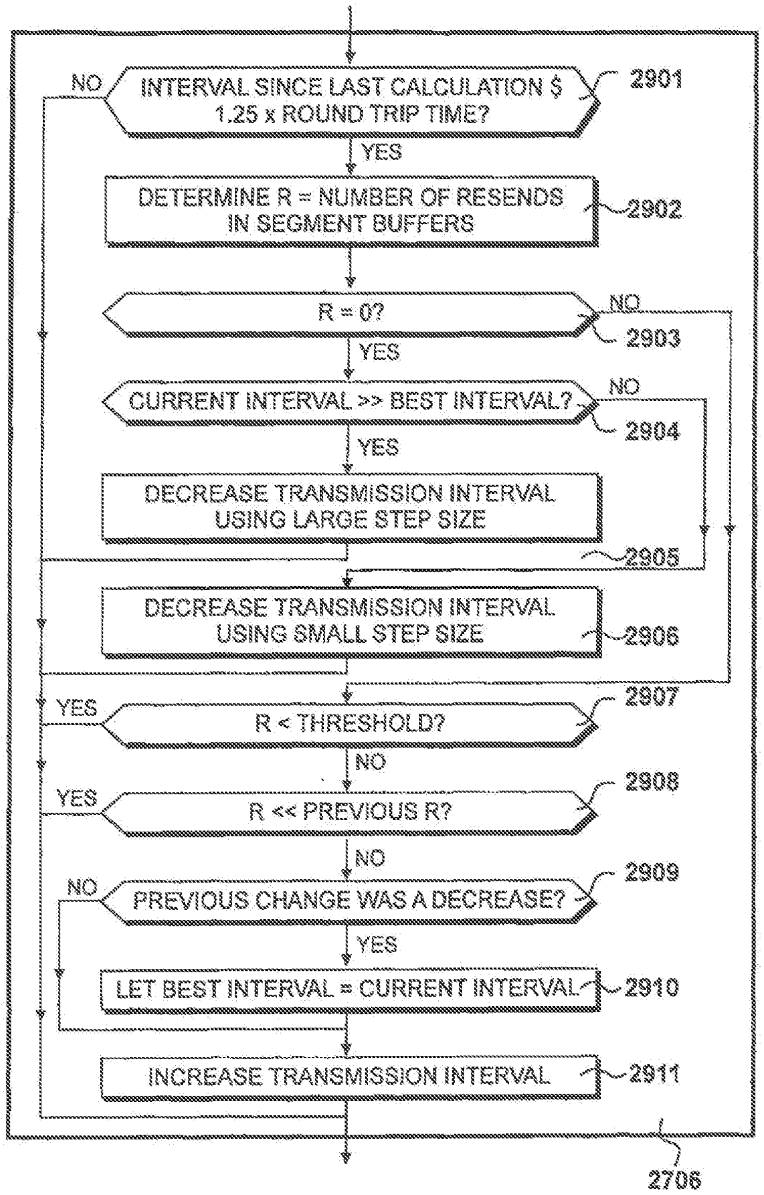


Figure 29

Ex.1079 / IPR2026-00210 / Page 711 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

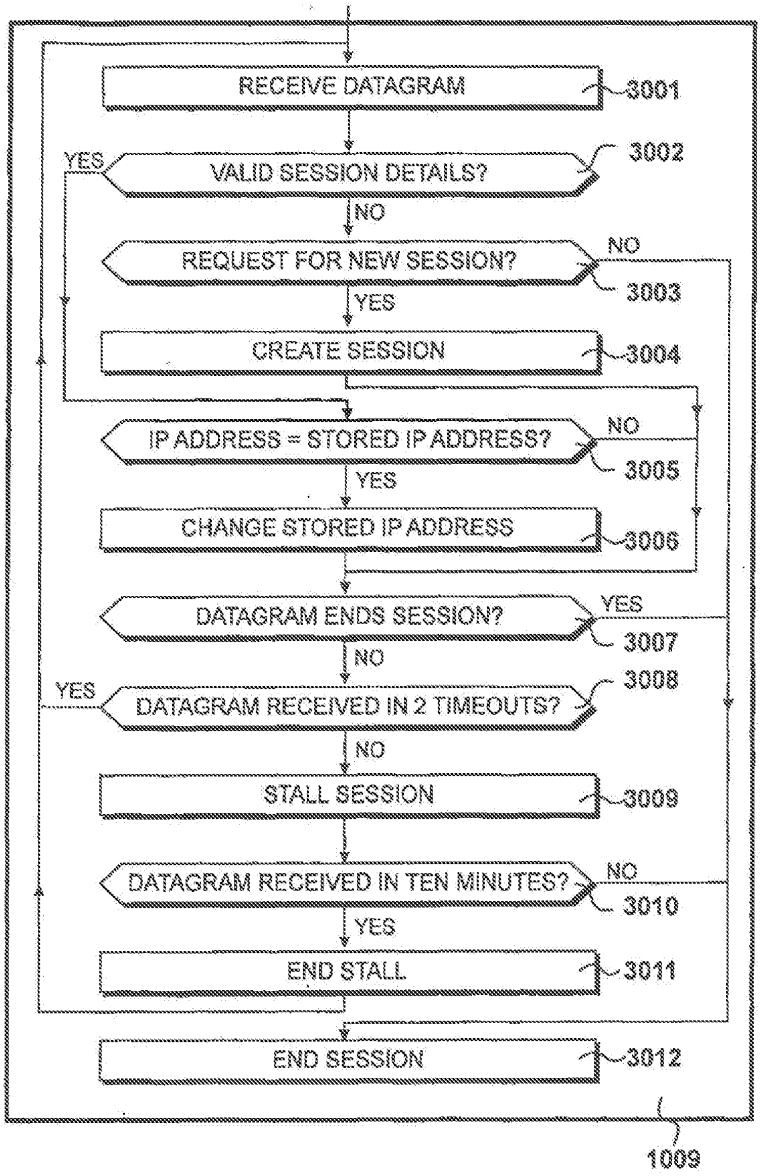


Figure 30

Ex.1079 / IPR2026-00210 / Page 712 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

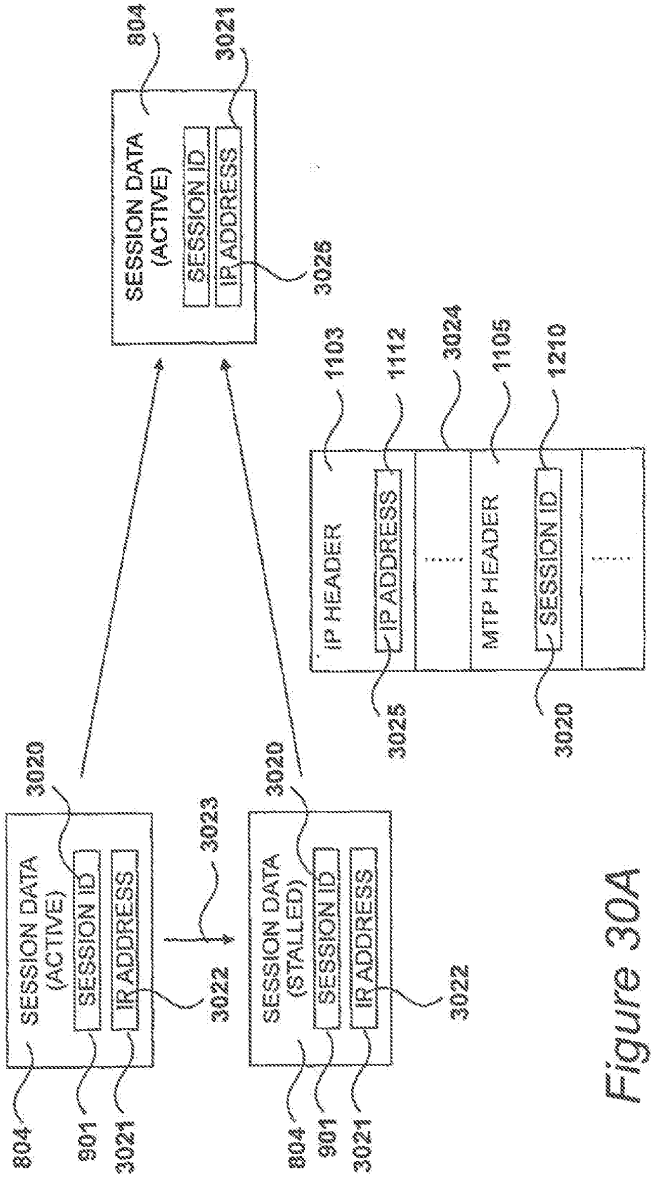


Figure 30A

Ex.1079 / IPR2026-00210 / Page 713 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

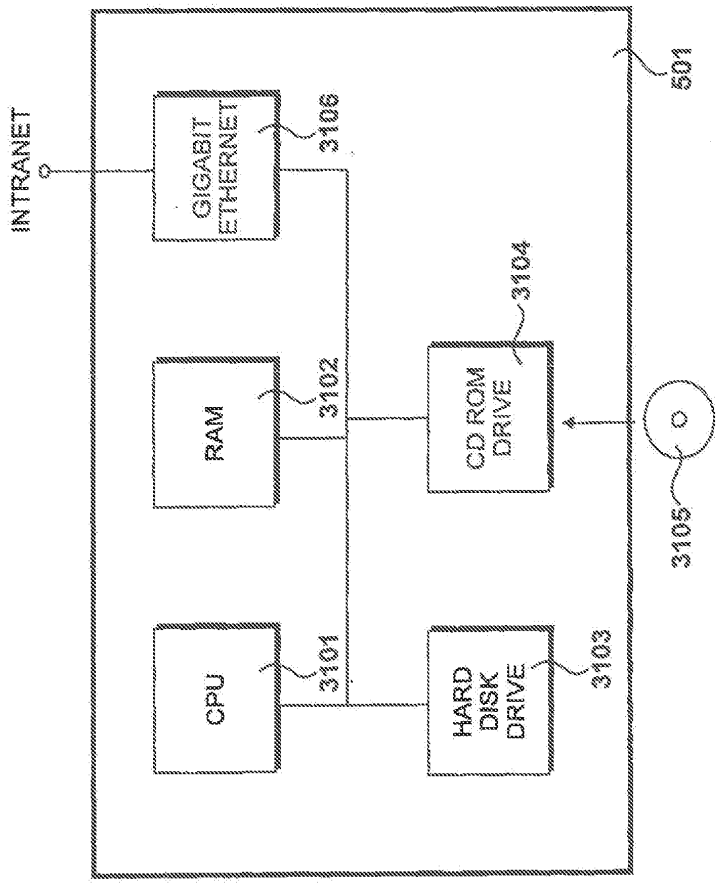


Figure 31

Ex.1079 / IPR2026-00210 / Page 714 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

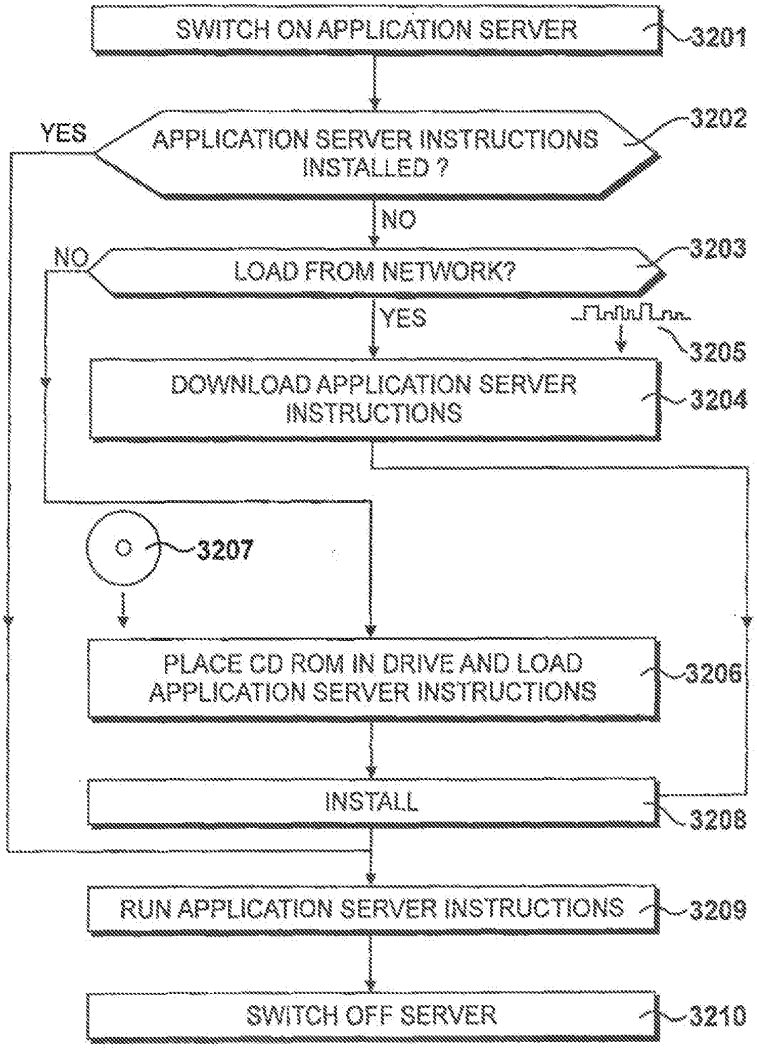


Figure 32

Ex.1079 / IPR2026-00210 / Page 715 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

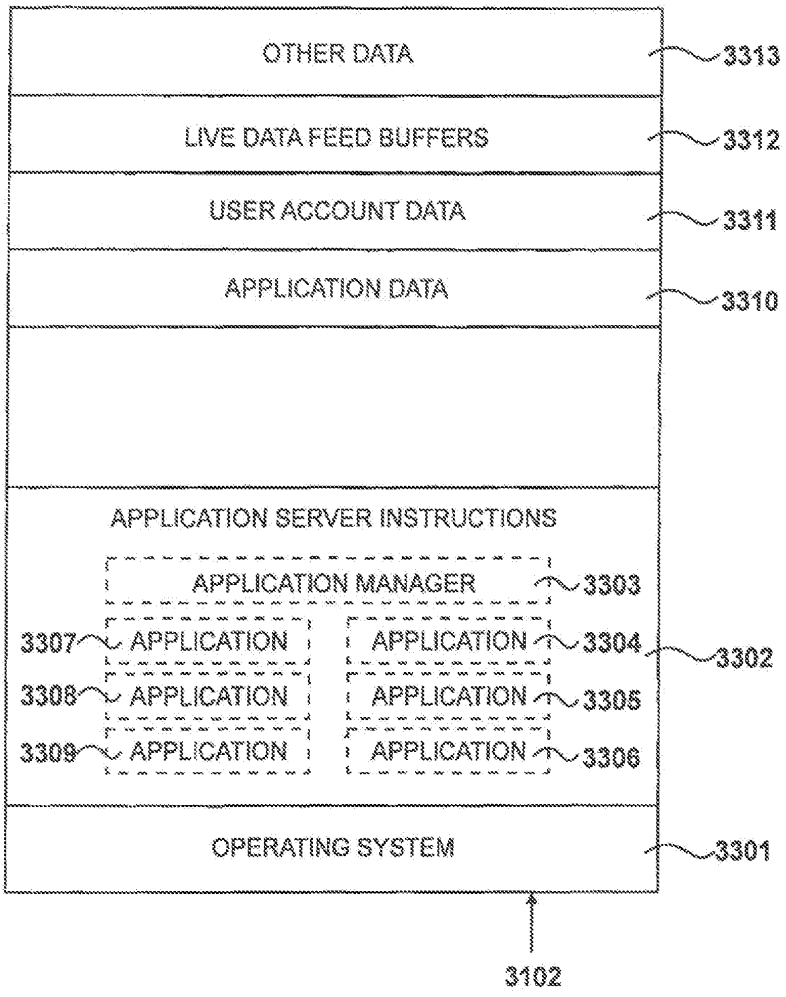


Figure 33

Ex.1079 / IPR2026-00210 / Page 716 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

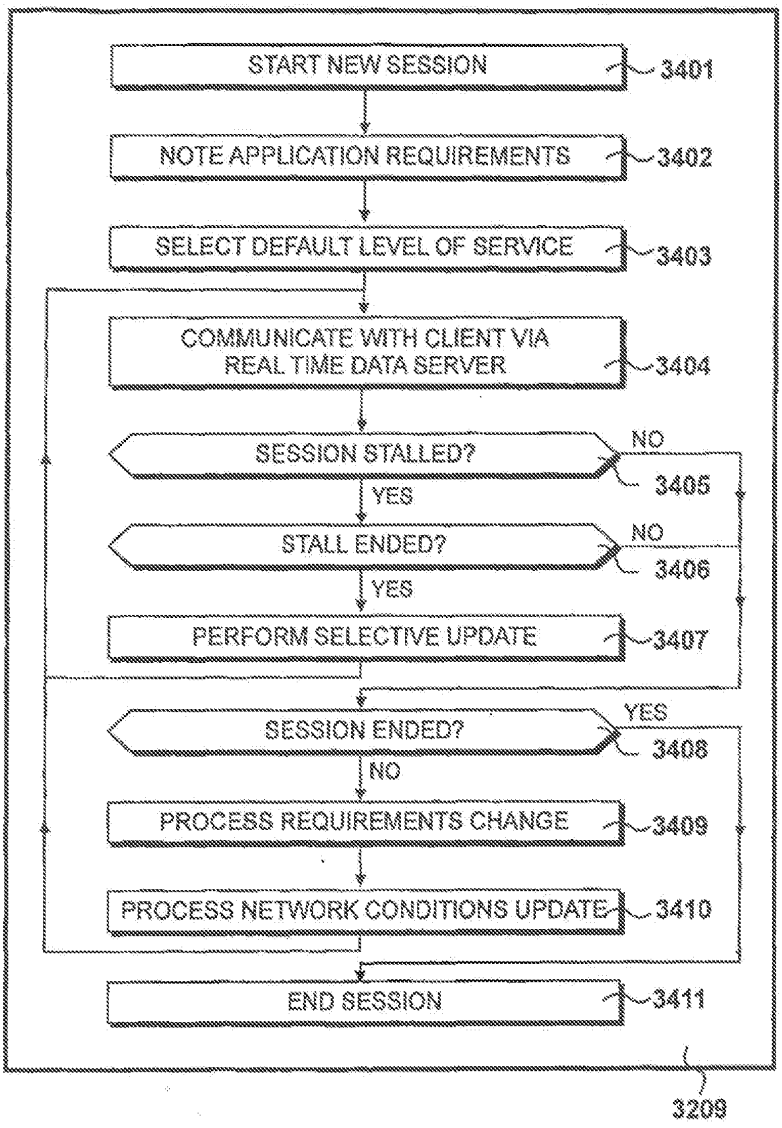


Figure 34

Ex.1079 / IPR2026-00210 / Page 717 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

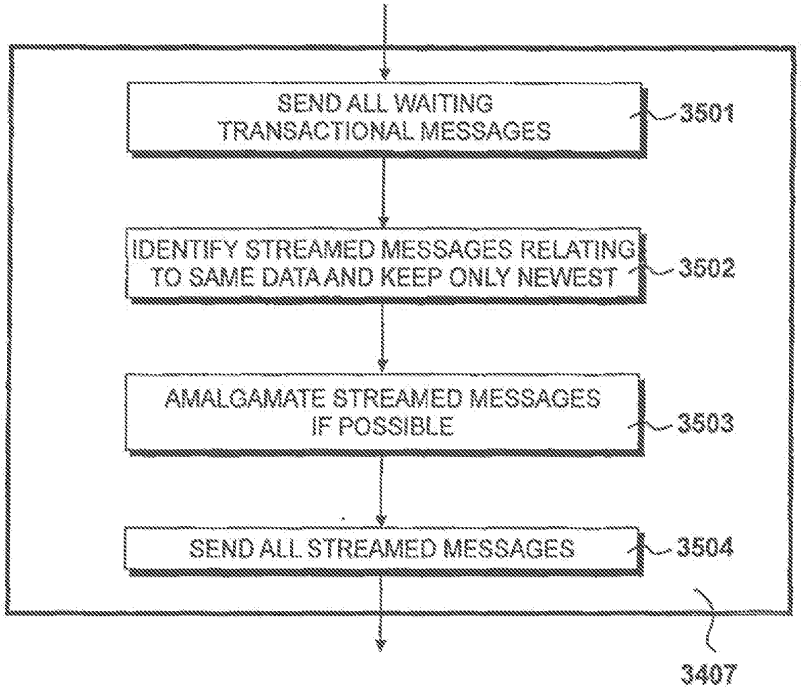

SEND ALL WAITING TRANSACTIONAL MESSAGES
3501
IDENTIFY STREAMED MESSAGES RELATING TO SAME DATA AND KEEP ONLY NEWEST
3502
AMALGAMATE STREAMED MESSAGES IF POSSIBLE
3503
SEND ALL STREAMED MESSAGES
3504
3407

Figure 35

Figure 36

Ex.1079 / IPR2026-00210 / Page 719 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

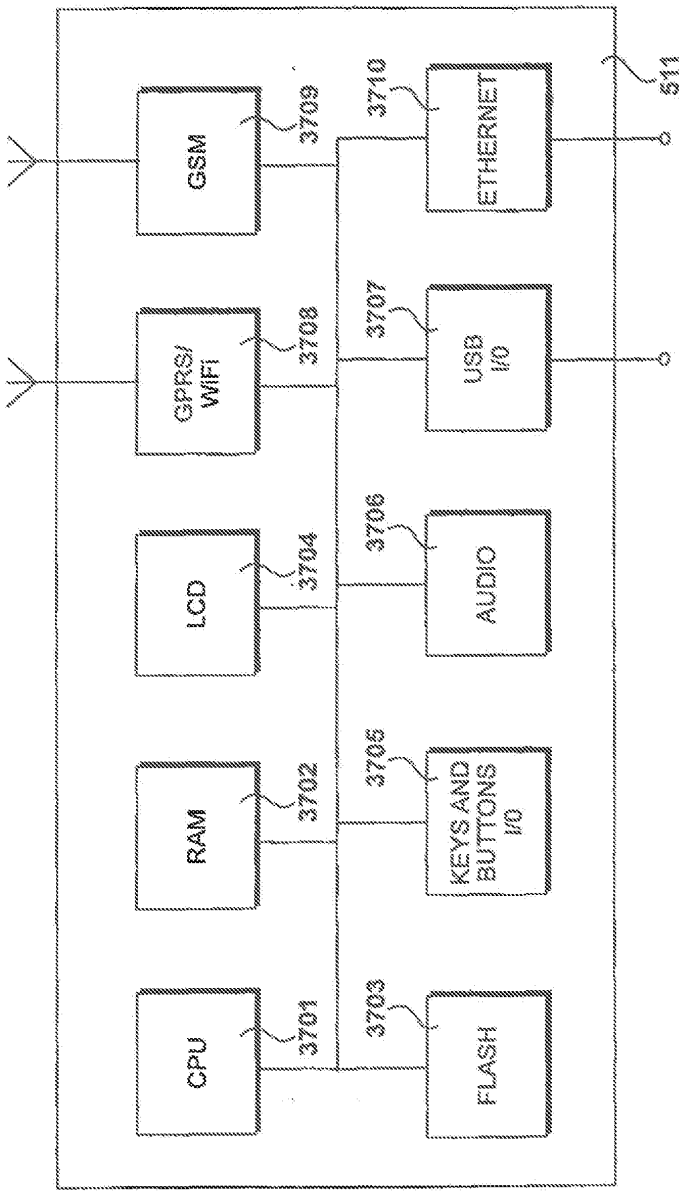


Figure 37

Ex.1079 / IPR2026-00210 / Page 720 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

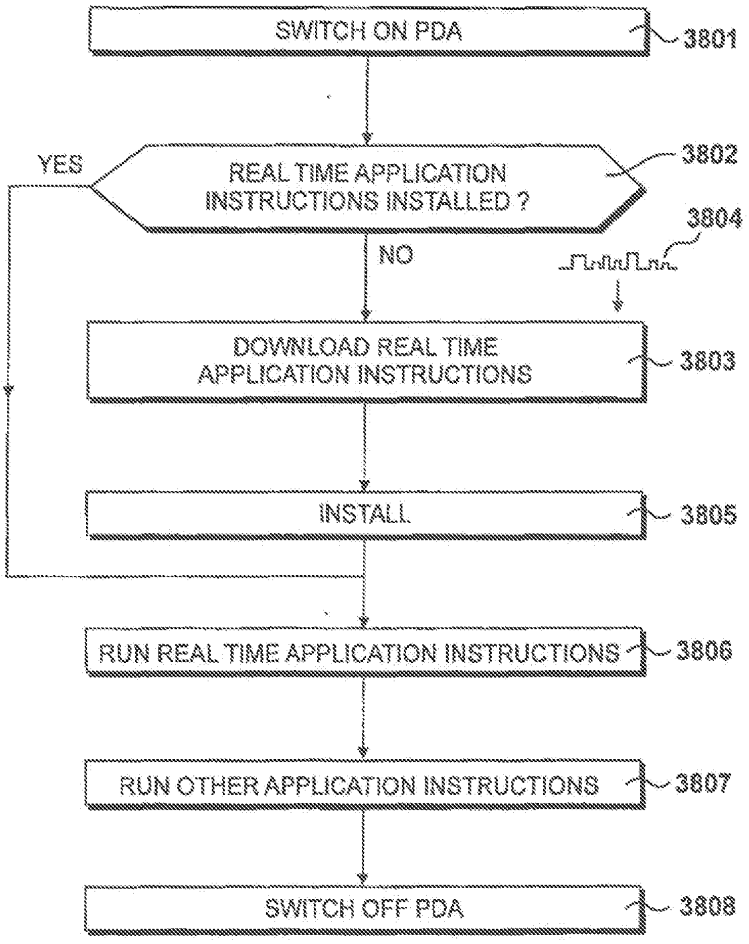


Figure 38

Ex.1079 / IPR2026-00210 / Page 721 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

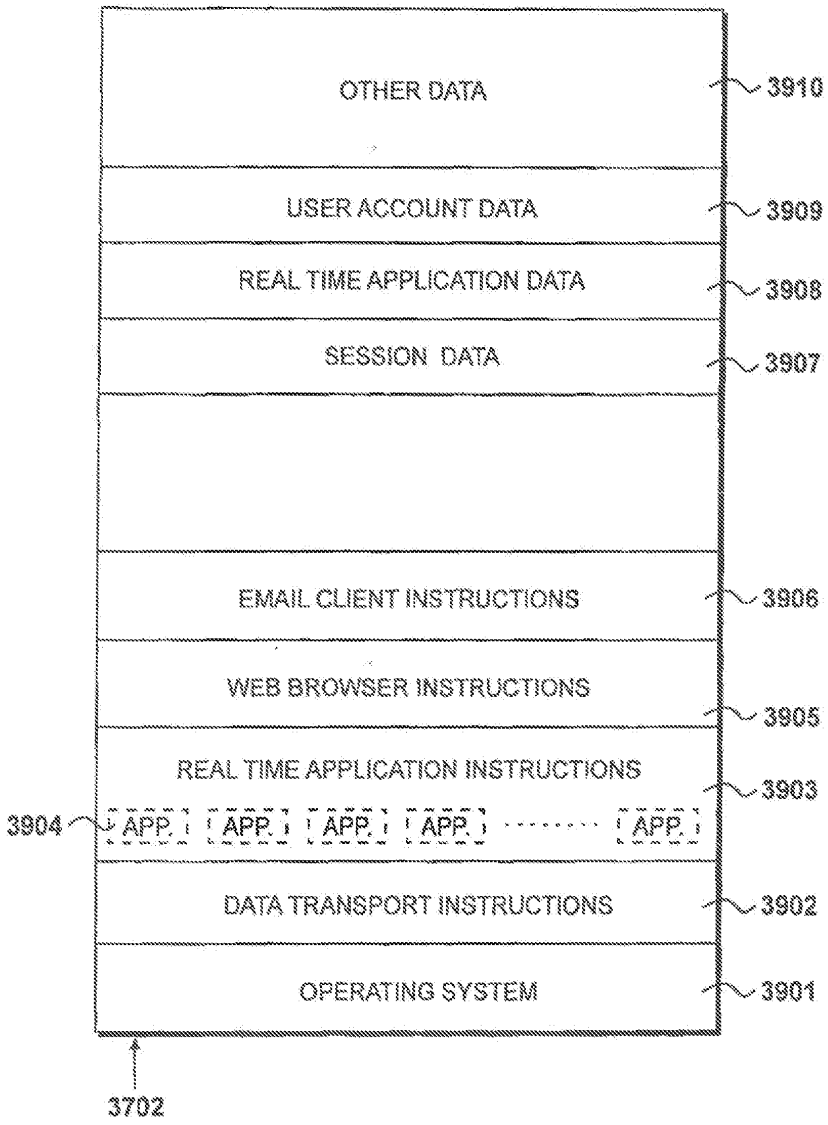

OTHER DATA
3910
USER ACCOUNT DATA
3909
REAL TIME APPLICATION DATA
3908
SESSION DATA
3907
EMAIL CLIENT INSTRUCTIONS
3906
WEB BROWSER INSTRUCTIONS
3905
REAL TIME APPLICATION INSTRUCTIONS
3903
3904
APP
APP
APP
APP
APP
DATA TRANSPORT INSTRUCTIONS
3902
OPERATING SYSTEM
3901
3702

Figure 39

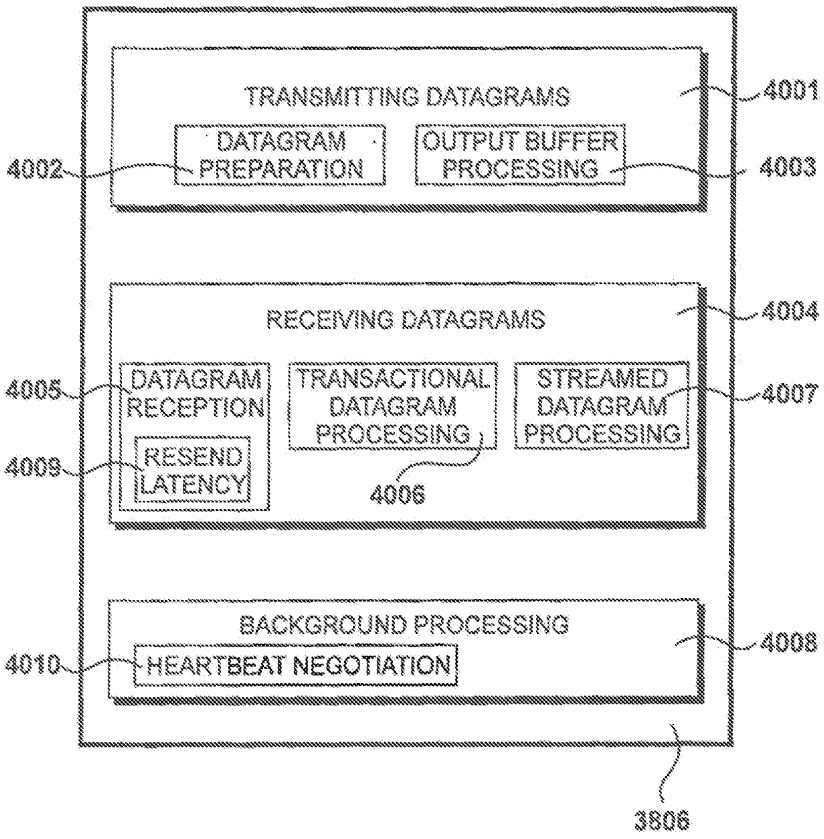

TRANSMITTING DATAGRAMS
4001
DATAGRAM PREPARATION
4002
OUTPUT BUFFER PROCESSING
4003
RECEIVING DATAGRAMS
4004
DATAGRAM RECEPTION
4005
TRANSACTIONAL DATAGRAM PROCESSING
4006
STREAMED DATAGRAM PROCESSING
4007
RESEND LATENCY
4009
BACKGROUND PROCESSING
4008
HEARTBEAT NEGOTIATION
4010
3806

Figure 40

Figure 41

Ex.1079 / IPR2026-00210 / Page 724 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

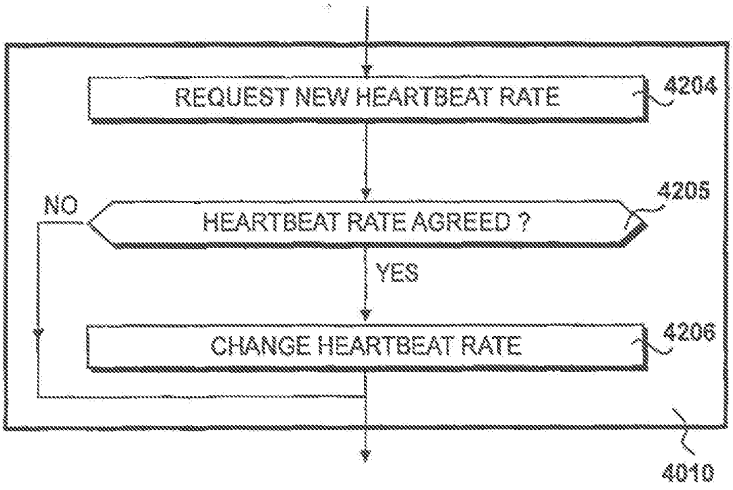

REQUEST NEW HEARTBEAT RATE
4204
NO
HEARTBEAT RATE AGREED ?
4205
YES
CHANGE HEARTBEAT RATE
4206
4010

Figure 42

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European Patent Office
Office européen des brevets

(11) EP 1 603 339 A1

(12) EUROPEAN PATENT APPLICATION

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(71) Applicant: STMicroelectronics S.r.l.
20041 Agrate Brianza (Milano) (IT)

(72) Inventors:
* Melpignano, Diego
20052 Monza (Milano) (IT)
* Olivieri, Stefano
20131 Milano (IT)

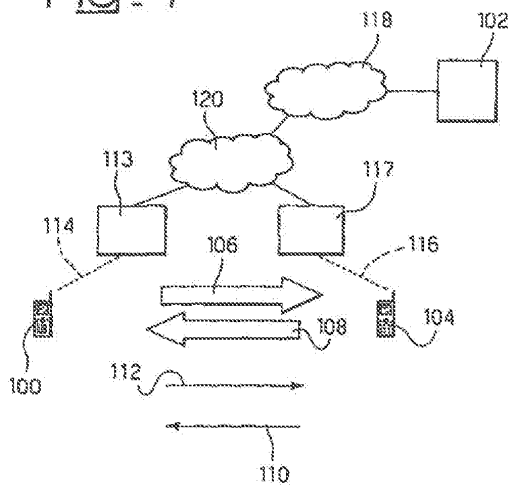
(74) Representative: Sosotti, Luciano
c/o Buzzi, Notaro & Antonielli d'Oulx
Via Maria Vittoria 18
10123 Torino (IT)

(54) Method and system for communicating video data in a packet-switched network, related network and computer program product therefor

(57) A method for communicating video data on a wireless channel in a packet-switched network, that includes the steps of operating at a wireless terminal (100) a compression (10; 204) in packets (106, 108) on the video data during a video coding operation, detecting wireless channel conditions and adapting control parameters of the video coding operation to the detected wireless channel conditions. The compression operation is a robust header compression operation (204) and the step of adapting control parameters of said video coding operation is performed in dependence of information (200, 210, 110) about the wireless channel conditions detected on a feedback channel made available in a decompression step (202) associated to the compression operation (204).

Preferred application in mobile phones and video over IP applications.

Fig. 4



EP 1 603 339 A1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the invention

[0001] The present invention relates to communication systems, and was developed by paying specific attention to mobile and wireless video communication systems.

[0002] In particular, this invention proposes a new technique for adapting the behavior of a video coder to the channel conditions, especially in the case of a wireless channel.

Description of the related art

[0003] Nowadays, mobile bi-directional video communication applications use circuit-switched channels and the H.324M protocol stack defined by the International Telecommunication Union (ITU). Static encoding schemes like H.263 with fixed output stream bitrate and coding parameters are used.

[0004] This solution is not very flexible.

[0005] Packet-switched networks, on the contrary, offer a higher degree of flexibility especially when connecting heterogeneous systems (like on the Internet network) at the cost of larger protocol overhead and implementation complexity. The increased overhead is due to packet headers, such a circumstance being particularly undesirable in cellular systems characterized by limited (and costly) bandwidth availability.

[0006] The use of packet switched channels and adaptive encoders can provide greater service flexibility, since a mobile terminal can communicate with any host through the Internet network. With suitable arrangements it is also possible to increase channel utilization, efficiency, and video quality.

[0007] However, current mobile videoconferencing systems do not exploit information available at different layers of the protocol stack to optimize the quality of the video-call: in this way, if the wireless channel conditions change, video frames may be dropped and errors may corrupt images for quite a long time.

[0008] From the end user point of view, UMTS (Universal Mobile Telecommunication System) is a network for services. The end-to-end services are carried over the Universal Mobile Telecommunication System network with bearers, where a bearer is a service providing a given Quality of Service class between two end points.

[0009] Universal Mobile Telecommunication System Quality of Service classes, also known as "traffic classes", are defined keeping in mind that the classification must be simple. In particular, from the end user point of view, the impression of the connection quality is very often related to the delay experienced on the connection. For this reason, the connection delay is the main separating attribute between the Universal Mobile Telecommunication System Quality of Service classes, whereas the other factors are guaranteed bit-rate (i.e. bandwidth) and nature of traffic (i.e. symmetric/asymmetric).

[0010] Four Quality of Service classes have been defined for Universal Mobile Telecommunication System services:

- Conversational class: minimum fixed delay, no buffering, symmetric traffic, guaranteed bit-rate.
- Streaming class: minimum variable delay, buffering allowed, asymmetric traffic, guaranteed bit-rate.
- Interactive class: moderate variable delay, buffering allowed, asymmetric traffic, no guaranteed bit-rate.
- Background class: big variable delay, buffering allowed, asymmetric traffic, no guaranteed bit-rate.

[0011] The conversational class is the most demanding Quality of Service class meant for Real Time traffic as, for instance, bi-directional video communication.

[0012] In conversational services the end-to-end delay has to be minimized to avoid any perceptual perturbations and to maintain synchronization of audio and video. Therefore, encoding, transmission and decoding of audio and video is performed simultaneously in real time and in both directions.

[0013] The mobile environment is characterized by harsh transmission conditions in terms of attenuation, fading, and shadowing, which may result in time-varying channel conditions.

[0014] The UMTS network provides many highly sophisticated techniques, such as space-time coding, diversity techniques, interleaving, and Turbo codes, in order to combat errors on the wireless link. However, these advanced tools can provide a negligible radio block error rate only for a relatively large value of tolerated maximum delay, whereas some amount of residual errors has to be tolerated for low-delay applications.

[0015] Therefore, a video coding standard has to be error-resilient in order to be applicable for conversational services in the wireless environment.

[0016] Another critical aspect concerning wireless video communication is that in general, the available bandwidth (and thus the bit-rate) over the radio link is limited and the costs for the user are expected to be proportional to the number of transmitted bits over the radio link. Thus, low bit-rates are likely to be typical, and compression efficiency is thus an important requirement for a video-coding standard to be successful in a mobile environment.

Ex.1079 / IPR2026-00210 / Page 727 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

[0017] Third Generation Partnership Project (3GPP) has chosen the RTP/UDP/IP stack, (Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol), for sending real-time or streaming data over Universal Mobile Telecommunication System IP-based Packet-Switched networks.

[0018] In this case, the encoded media is encapsulated in the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol packet with media specific Realtime Transport Protocol payload formats defined by the International Engineering Task Force.

[0019] This packet in turn, after header compression, is encapsulated into one Packet Data Convergence Protocol Point-to-Point Protocol (PDCP/PPP) packet, thus becoming a Radio Link Control (RLC) Service Data Unit (SDU).

[0020] The Radio Link Control protocol provides segmentation and retransmission services for both users and control data.

[0021] It can operate in three modes, namely Transparent Mode (TM), Acknowledged Mode (AM) or Unacknowledged Mode (UM).

[0022] In Transparent Mode no protocol overhead is added to higher layer data. Erroneous Packet Data Units (EPDU) can be discarded or marked erroneous.

[0023] In the Acknowledged Mode an automatic repeat request mechanism is used for error correction.

[0024] Contrarily, Unacknowledged Mode does not use any retransmission protocol, which implies that data delivery is not guaranteed.

[0025] Due to time-delay constraints, for bi-directional video communication Third Generation Partnership Project indicates bearers using Unacknowledged Mode Radio Link Control.

[0026] The Request For Comments 3550 (Realtime Transport Protocol), described in IETF RFC 3550, "RTP: A Transport Protocol for Real-Time Applications", does not impose a maximum size on Realtime Transport Protocol packets. However, when Realtime Transport Protocol packets are sent over the radio link of a Third Generation Partnership Project Packet Switched system there is an advantage in limiting the maximum size of Realtime Transport Protocol packets both for Acknowledged Mode and Unacknowledged Mode modes of operation.

[0027] In Unacknowledged Mode large Realtime Transport Protocol packets are more susceptible to losses over the radio link compared to small Realtime Transport Protocol packets since the loss of a segment may result in the loss of the whole packet.

[0028] On the other hand in Acknowledge Mode large Realtime Transport Protocol packets will result in larger delay jitter compared to small packets, as there is a larger chance that more segments have to be retransmitted.

[0029] For these reasons, Third Generation Partnership Project recommends that the maximum size of Realtime Transport Protocol packets should be limited in size taking into account the wireless link. This will decrease the Realtime Transport Protocol packet loss rate particularly for Realtime Transport Protocol in Unacknowledged Mode.

[0030] For Realtime Transport Protocol in Acknowledged Mode the delay jitter will be reduced permitting the client to use a smaller receiving buffer. It should also be noted that too small Realtime Transport Protocol packets could result in too much overhead, if IP/UDP/RTP (Internet Protocol / Unreliable Datagram Protocol / Realtime Transport Protocol) header compression is not applied, or in unnecessary load at the streaming server.

[0031] In the case of transporting video in the payload of Realtime Transport Protocol packets it may happen that a video frame is split into more than one Realtime Transport Protocol packet in order not to produce too large Realtime Transport Protocol packets.

[0032] Then, to be able to decode packets following a lost packet in the same video frame, Third Generation Partnership Protocol recommends that synchronization information should be inserted at the start of such Realtime Transport Protocol packets.

[0033] For example, for H.263 this implies the use of Group of Blocks (GOBs) with non-empty Group of Blocks headers and in the case of MPEG-4 video the use of video packets (resynchronization markers).

[0034] Besides transfer of user data, Packet Data Convergence Protocol performs also the header compression and decompression of IP data streams, e.g. Transport Control Protocol / Internet Protocol (TCP/IP) and Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol headers for Ipv4 and Ipv6, at the transmitting and receiving entity, respectively.

[0035] According to the specifications of Third Generation Partnership Protocol TS 25.323 (Rel. 4), "Packet Data Convergence Protocol (PDCP) Specification", two header compression protocol types, i.e. "RFC 2507" and "RFC 3095 (ROHC)" are supported on Universal Mobile Telecommunications System networks.

[0036] By utilizing the Packet Identifier (PID) field in the Packet Data Convergence Protocol Packet Data Unit (PDCP/PDU), the Packet Data Convergence Protocol sublayer is then able to identify the specific header compression protocol and, as far as Robust Header Compression is concerned, to also distinguish different contexts.

[0037] Robust Header Compression (ROHC) as standardized by the International Engineering Task Force (IETF) and adopted by the Third Generation Partnership Project (3GPP) starting from Release 4, provides an extensible framework for robust header compression that is designed for IP data flows over wireless channels.

[0038] In US20020146000 the basic algorithms for Robust Header Compression are presented together with their

Ex.1079 / IPR2026-00210 / Page 728 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

application to voice-over-IP services.

[0039] So far, the Robust Header Compression recommendation has defined four profiles:

- Uncompressed IP packets;
- Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol (RTP/UDP/IP);
- Unreliable Datagram Protocol / Internet Protocol (UDP/IP);
- Encapsulating Security Payload (ESP/IP).

[0040] Figure 1 shows a compressor chain where reference 10 indicates a compressor, operating a Robust Header Compression operation, and 20 indicates a correspondent decompressor, that are comprised in video coders/encoders, not shown as a whole in Figure 1, separated by a wireless transmission channel.

[0041] The Robust Header Compression compressor 10 and decompressor 20 need to maintain context information 30 so that static header fields 11, i.e. those headers that remain unchanged within a given context, are not transmitted at all. Only dynamic fields 12 of the real-time flow are transmitted after suitable encoding in compressed fields 13.

[0042] For a Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol flow the dynamic header fields are listed below:

- IPv4 identification (IP-ID) (16 bits),
- Unreliable Datagram Protocol Checksum (16 bits),
- Realtime Transport Protocol Marker (M-bit) (1 bit), ,
- Realtime Transport Protocol Sequence Number (SN) (16 bits),
- Realtime Transport Protocol Timestamp (TS) (32 bits) .

All the other header fields are either static or inferred, i.e. never change or can be calculated by link layer information, respectively.

[0043] Figure 2 shows the compressor states. Initially the compressor 10 is in a Initialization and Refresh (IR) state 40, where the headers are sent non-compressed so that the decompressor 20 can create a context for the Internet Protocol flow.

[0044] In a First Order (FO) state 50 the compressor 10 only sends updates of the static fields to the decompressor 20 to compensate for irregularities in the stream that may corrupt the context. Therefore, in this state, the compressor 10 sends only context updates.

[0045] In a Second Order (SO) state 60, the compressor 10 sends compressed headers 12 since it is confident that the decompressor 20 has correctly received a valid context. This is the state in which the compressor 10 should normally operate. Only when stream irregularities are found the compressor 10 goes to the First Order state 50 or even to the Initialization and Refresh state 40.

[0046] Figure 3 shows the decompressor states. The decompressor 20 starts in a "no-context" (NC) state 70. Upon successful decompression of a header, it passes to a "full context" (FC) state 90, which is the normal operating state. Only after repeated failures in decompressing headers, the decompressor 20 passes to a "static context" (SC) state 80, waiting for context update packets (sent by the compressor 10 in the First Order state 40). If a valid context cannot be recovered, the decompressor returns to the "no context" state.

[0047] Transitions among states are governed by operating modes. Robust Header Compression defines three operating modes: Unidirectional (U-mode), bi-directional Optimistic (O-mode) and bi-directional Reliable (R-mode).

[0048] In the U-mode a feedback channel from the decompressor to the compressor does not exist (or cannot be used) so that transitions between compressor states are only based on periodic timeouts and irregularities in the incoming packet headers, periodic refreshes of the context are needed. In the O-mode, a feedback channel is used for error recovery requests and (optionally) acknowledgements of context updates: the rationale behind this operating mode is to minimize the use of the feedback channel.

[0049] Finally, the R-mode makes intensive use of the feedback channel in order to maximize robustness against loss propagation and damage propagation.

[0050] Given a header field value v to be compressed, in ROHC a Window-based Least Significant Bit (W-LSB) algorithm is applied that transmits only its least significant bits, provided a suitable reference value v_ref is maintained both at the compressor 10 and at the decompressor 20. In order to avoid mismatches between reference values v_ref, a robust algorithm is defined which selects the reference value v_ref within a Variable Sliding Window (VSW). The number of least significant bits k to transmit for the header field value v to be compressed is selected according to the following relation:

Ex.1079 / IPR2026-00210 / Page 729 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

$$f(v\_ref,k)=[v\_ref-p,v\_ref+(2^k-1)-p] \quad (1)$$

f(v_ref, k) represents an interval in which the header field value v is expected to vary. The offset parameter p can be chosen according to the behavior of the specific field to compress.

[0051] Now, at the compressor 10 the number of least significant bits k can be chosen in such a way that:

$$k=g(v\_ref,v)\triangleq\min\{k : v\in f(v\_ref,k)\} \quad (2)$$

So k would be the minimum value such that the header field value v falls in the interval f(v_ref, k).

[0052] However, this scheme would not be robust against errors because the compressor has no knowledge that the decompressor is using the same reference value (which could actually be different because of transmission errors). Instead, a variable sliding window is introduced:

$$VSW = \{v_{i-w}, v_i\} \quad (3)$$

where w indicates a window size, i.e. the last w values that have been transmitted. Whenever a new value enters the compressor, it is appended to Variable Sliding Window. When the compressor is sufficiently confident that some of the older values in Variable Sliding Window have been correctly received, those values are removed from Variable Sliding Window.

$$v_{min} = \min(VSW)\ ,\ v_{max} = \max(VSW) \quad (4)$$

are the minimum and maximum values in Variable Sliding Window.

[0053] In the Window-based Least Significant Bit coding scheme, the selection of the number of least significant bits k is made according to the following formula:

$$k\triangleq\max(g(v,v_{min}),g(v,v_{max})) \quad (5)$$

where function g() has been defined in equation (2).

[0054] In this way, a higher number of bits is used to encode the field due to the uncertainty that the decompressor has a good reference interval for decoding the transmitted m bits.

[0055] In fact, the decoding technique at the decompressor is based on the following algorithm.

$$I_d = f(v\_ref\_d,m) \quad (6)$$

v_ref_d is the last correctly decompressed value, m is the number of bits received and I_d is the interpretation interval.

[0056] The decompressed field is simply derived by picking the value in the above interpretation interval whose m least significant bits match the received m bits.

[0057] The size w of the Variable Sliding Window depends on the confidence that the compressor has on the decompressor state, which in turn depends on the selected Robust Header Compression mode. For U and O modes, w is implementation dependent. In R-mode explicit feedback from the decompressor can be used to minimize the sliding window dimension and therefore maximizing the compression ratio.

[0058] The Window-based Least Significant Bit algorithm will be now explained by way of a example.

[0059] Assuming that the compressor 10 has transmitted the values 151, 152, 153, 154 and 155 and that the last three ones have not been received because of transmission errors on the wireless link, then, at the compressor 10 will be Variable Sliding Window = {151,152,153,154,155}, v_{min}=151 and v_{max}=155.

[0060] If, now, the value 156 enters the compressor 10, the number of least significant bits k to transmit is given by relation (5), which yields k = max (3,1) = 3.

[0061] So the last three Least Significant Bits of the value 156 = '10011100' are transmitted, i.e. '100'.

Ex.1079 / IPR2026-00210 / Page 730 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

[0062] At the decompressor 20, since the values 153, 154 and 155 have been lost, the last good reference value is 152.

[0063] According to relation (6), the decompressor 20 has thus an interpretation interval $I_d = [152, 159]$, which is expanded below in Table 1, where the first column contains the decimal value and the second column contains the corresponding binary value.

Table 1

Dec	Bin
152	10011000
153	10011001
154	10011010
155	10011011
156	10011100 <<<
157	10011101
158	10011110
159	10011111

[0064] Within this interval the only value whose three Least Significant Bits match the pattern '100' is the number 156.

[0065] The correctness of the decompression can be checked by applying a small Cyclic Redundancy Check (CRC) to the original header, from 3 to 8 bits depending on mode, in order to avoid that an undetected transmission error leads to a wrong decompressed value, which, in turn, would be used later as a reference value, leading to damage propagation.

[0066] Failure of the Cyclic Redundancy Check to detect a damaged value is also compensated for in the Robust Header Compression framework (see IEFT RFC 3095, "Robust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed", section 5.3.2.2.3).

[0067] The Window-based Least Significant Bit coding algorithm is not the only one that is used in the Robust Header Compression framework.

[0068] Other schemes exist that take advantage of specific characteristics of some header fields such as, for example, the Realtime Transport Protocol timestamp, which usually increases in regular steps over time (multiple of a TS_STRIDE value).

[0069] This characteristic is exploited by "scaled Realtime Transport Protocol timestamp" encoding.

[0070] Realtime Transport Protocol timestamp can also be approximated with a linear function of the time of day for traffic generated at constant rate, fixed sampling frequency and when packet generation is locked to the sampling frequency. In this case "timer-based compression of Realtime Transport Protocol timestamp" applies.

[0071] The Internet Protocol identification field (IP-ID) is encoded by considering only offsets between the IP-ID and the Realtime Transport Protocol sequence number (the latter increases by one for each new packet) and applying Window-based Least Significant Bit encoding to such offsets.

[0072] Constant header fields of the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol stream to be compressed can be structured as ordered lists. The Robust Header Compression framework provides means to handle such lists in such a way that list items (that form the context) in the decompressor can be flexibly inserted, removed or changed by the compressor.

[0073] The dynamic fields of the Realtime Transport Protocol header are encoded according to Table 2.

Table 2

Field	Coding	Comments
RTP-SN Sequence Number	Window-based Least Significant Bit	$p=2^{k-3}-1$, k>4, p=1 otherwise
IP-ID	Offset IP-ID	Unless IP-ID varies randomly (RND flag <> 0)
RTP-TS Timestamp	- Timer-based - Scaled RTP TS - No compression	Depending on flag values in the header (TS-STRIDE, Tsc) $p=2^{k-2}-1$

Ex.1079 / IPR2026-00210 / Page 731 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Table 2 (continued)

Field	Coding	Comments
Cyclic Redundancy Check	3, 7 or 8 bits	Calculated over the original uncompressed header
Marker bit	Only updated when it changes	Context initially set to 0

[0074] The Realtime Transport Protocol Timestamp and IP-ID fields can often be derived from the Realtime Transport Protocol Sequence Number, since IP-ID usually increases by the same difference or delta as the sequence number and the timestamp by the same delta times a fixed value. Therefore, when these conditions apply, only the Realtime Transport Protocol Sequence Number is included in the compressed header and the functions to derive the other fields are included in the context.

[0075] A Robust Header Compression packet has the format shown in Table 3:

Padding
Feedback
Header
Payload

Table 3

[0076] The first field in the packet of Table 3 is the Padding field and is an optional field with variable length. The second field is the Feedback field that comprises zero or more feedback elements. The third field is the Header field that is Variable, with Context ID information (CID).

[0077] Each element of the packet in Table 3, with the exception of the payload, starts with a unique bit pattern.

[0078] Headers carry Context ID information: they may include one byte add-Context ID octet (starting with the pattern '1110') for small Context IDs between 1 and 15 or carry embedded Context ID information when the Context ID space is large (up to 2 bytes). Context ID = 0 is not transmitted; in that case the packet starts with the packet type, which is a unique bit pattern different from '1110' and a null Context ID is implied.

[0079] Feedback information can be piggybacked to any Robust Header Compression packet and carries negative and positive acknowledgements for context updates and header decompression. Feedback packets can also be used by the decompressor, to request transitions between modes (e.g. from U-mode to O-mode).

[0080] Several packets types are defined by Robust Header Compression depending on their function, the used mode and which field is carried. The notation for Robust Header Compression packets is:

<Mode>-<Type>-<Optional Fields>.

[0081] For example, an UOR-2 packet can be used in U-mode, O-mode or R-mode and is of type 2.

[0082] In the Realtime Transport Protocol profile three packet types are used to identify compressed headers and two for initialization and refresh as shown below:

i) (R-0, R-0-CRC,UO-0) this is the minimal packet type where only the W- Window-based Least Significant Bit encoded Realtime Transport Protocol - Sequence Number is transmitted, since all the functions to derive the other fields are known at the decompressor.

ii) (R-1, R-1-ID, R-1-TS, UO-1, UO-1-ID, UO-1-TS) this packet is used when the number of bits needed to encode the Realtime Transport Protocol - Sequence Number exceeds those available in packet type i) or when the functions to derive Realtime Transport Protocol Timestamp and IP-ID from Realtime Transport Protocol Sequence Number change.

iii) (UOR-2, UOR-2-ID, UOR-2-TS) used to change parameters of any Sequence Number - function.

iv) IR: this packet is used to communicate the static part of the context, i.e. the constant Sequence Number functions

v) IR-DYN: this packet type is used to communicate the dynamic part of the context, i.e. the non-constant Sequence Number - functions.

Ex.1079 / IPR2026-00210 / Page 732 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

[0083] The bit patterns that form unique prefixes for each of the packet type are shown in Table 4.

[0084] Upon receiving a packet, the decompressor parses the first byte and consequently drives its state machine.

[0085] The Initialization and Refresh packet allows the decompressor to create a context for the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol flow. Its structure is shown below in Table 5.

Table 4

Packet type	Pattern
Add-CID	1110
Padding	11100000
Feedback	11110
IR	1111110
IR-DYN	11111000
Segment	1111111
R-0	00
R-0-CRC	01
UO-0	0
R-1, R-1-ID, R-1-TS	10
UO-1, UO-1-ID, UO-1-TS	10
UOR-2, UOR-2-ID, UOR-2-TS	110

0 7		
Add-CID octet		1
1111110	D	1
CID info (opt.)		0-2, large CIDs
profile		
CRC		
Static chain		variable
Dynamic chain		variable Present if D=1
Payload		

Table 5

[0086] The Add - Context ID octet allows associating a context identifier to the static header information that is carried in the rest of the packet.

[0087] The D bit is profile specific and, in the case of the Realtime Transport Protocol profile, it indicates the presence of a dynamic sub-header information right after the static chain.

[0088] The Context ID info field is present only if big context identifiers need to be used. The profile field is an identifier

Ex.1079 / IPR2026-00210 / Page 733 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

for the Robust Header Compression profile. An 8-bit Cyclic Redundancy Check follows (see IEFT RFC 3095, "Robust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed", section 5.9.1 for the generator polynomial and on which fields the value is computed).

[0089] The static chain contains the ordered list of static header fields.

[0090] For example, an IPv4 header should be initialized with a static part that includes: version, protocol, source address and destination address. The dynamic part of the IPv4 header includes type of service time to live, identification, Data Field, Random (RND), Network Byte Order (NBO), extension header list.

[0091] The IR-DYN packet is used to update the dynamic part of the context.

0 7	
Add-CID octet (opt.)	
11111000	1
0-2 octets CID info (opt.)	
Profile	1
CRC	1
Dynamic chain	variable
Payload	

Table 6

[0092] Only the dynamic chain is carried in this case.

[0093] The compressed packet format is shown in Table 7. It can be noticed that its structure depends on many conditions (Cx) so that its processing may not be obvious.

Ex.1079 / IPR2026-00210 / Page 734 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

0 7	
Add-CID octet (opt.)	
Base header	1 byte, Type indication
0-2 octets CID info (opt.)	
Remainder of base header	1
Extension	variable, C0
IP-ID outer IPv4 header	2 bytes, C1
AH data for outer list	Variable
GRE checksum	2 bytes, C2
IP-ID of inner IPv4 header	2 bytes, C3
AH data for inner list	Variable
GRE checksum	2 bytes, C4
UDP checksum	2 bytes, C5

Table 7

[0094] Conditions depend on values of previously decoded flag fields.

[0095] Header extensions may be optionally present to carry additional Robust Header Compression information (four different extension types are defined). An IP-ID field may be present if the context indicates that this field varies randomly.

[0096] AH data refers to Authentication Headers, which contain values for security associations. The Generic Routing Encapsulation (GRE) checksum refers to Generic Routing Encapsulation tunnels (RFC2784, RFC2890).

[0097] The Unreliable Datagram Protocol checksum is present only when explicitly indicated in the context.

[0098] For what concerns the video encoding, the H.264 hybrid video coding standard is known, whose primary goals are improved coding efficiency and improved network adaptation. The syntax of H.264 permits a significant reduction in bit-rate compared to all previous standards such as H.263 and MPEG-4 at the same quality level.

[0099] H.264 has been designed for technical solutions including broadcasting services, interactive or serial storage, conversational services, Video on Demand and Multimedia Messaging Services. Moreover, new applications may be deployed over existing and future networks.

[0100] To address this need for flexibility and customizability, the H.264 design covers both Video Coding Layer (VCL), which is designed to efficiently represent the video content, and a Network Abstraction Layer (NAL), which formats the Video Coding Layer representation and provides header information in a manner appropriate for conveyance by a variety of transport layers or storage media.

[0101] H.264 introduces three new features that impact the motion estimation process.

[0102] First, Multiframe Prediction allows using more than one previously decoded frame for forward motion estima-

Ex.1079 / IPR2026-00210 / Page 735 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

tion. Second, a precision of one fourth of pixel for motion vectors can be achieved through sub-pixel interpolation.

[0103] Moreover, a 16x16 macroblock can be partitioned in seven different ways, and each partition can have its own independent motion vector. This means that up to 16 different motion vectors can be used for a single macroblock, and each of them can be unrestricted, i.e. it can point to a predictor partially lying outside the reference frame.

[0104] The bi-directional prediction can also be used, but no more than one single reference frame is allowed to the backward motion estimation, in order to reduce the size of the reorder buffer. Instead, there is no limitation on the number of B frames that can be placed between two anchor frames (even none).

[0105] During the motion estimation process, two different cost functions can be used to evaluate the goodness of a predictor.

[0106] The first one is named SAD, Sum of Absolute Differences, the second one is SATD, Sum of Absolute Transformed Differences. It is well known that the Sum of Absolute Differences minimization cannot produce a bitstream of minimum size, because the prediction error will be encoded in the frequency domain. This is why H.264 allows to compute the matching error through the Hadamard transform, which is a very simple frequency transform having square waves base functions, in such a way, the transform matrix contains only +1 and -1 values and it can be computed without multiplications.

[0107] Furthermore, two different modalities can be applied to choose the best encoding mode for each macroblock: in "low-complexity" mode, the cost function is simply either the above-mentioned Sum of Absolute Differences or Sum of Absolute Transformed Differences, whereas in "high-complexity" mode a rate-distortion optimization is performed by evaluating a Lagrangian functional.

[0108] The frequency transform is computed by means of a 16x16 or 4x4 integer transform, having the same statistical properties of the Discrete Cosine Transform (DCT) used by MPEG standards. A 2x2 dedicated transform is applied only to the chrominance components.

[0109] Transformed coefficients information is reduced to fit the desired rate through a quantization step, which is also used to vary the strength of a de-blocking loop filter that operates at macroblock level during the coding process.

[0110] H.264 allows two ways to perform the variable length coding: CAVLC (Context-Adaptive Variable Length Coding) and CABAC (Context-Adaptive Binary Arithmetic Coding) .

[0111] The Context-Adaptive Variable Length Coding comprises a combination of adaptive Huffman coding, used to encode residual 4x4 block data, and Exp-Golomb coding, dedicated to the translation of headers in regular code-words. It can be proved that the Huffman method provides an optimal code only if the probability of the symbols are exact powers of 0.5. The Context-Adaptive Binary Arithmetic Coding overcomes this disadvantage by assigning a code to a sequence of symbols, so each symbol can be coded with a fractional number of bits. Adapting the variable length codes to the instantaneous statistical frequency of the symbols further raises the performance.

[0112] The coded video data is organized into Network Adaptation Layer (NAL) units, each of which is actually a packet that contains an integer number of bytes. The first byte of each Network Adaptation Layer unit is a header byte that contains an indication of the type of data in the Network Adaptation Layer unit (NALU), and the remaining bytes contain payload data of the type indicated by the header. The Network Adaptation Layer unit structure definition specifies a generic format for use in both packet-oriented and bitstream-oriented transport systems, and a series of Network Adaptation Layer units generated by an encoder is referred to as a Network Adaptation Layer unit stream.

[0113] Network Adaptation Layer units are classified into Video Coding Layer and non- Video Coding Layer Network Adaptation Layer units. The Video Coding Layer Network Adaptation Layer units contain the data that represent the values of the samples in the video pictures, and the non- Video Coding Layer Network Adaptation Layer units contain any associated additional information such as parameter sets (important header data that can apply to a large number of Video Coding Layer Network Adaptation Layer units) and supplemental enhancement information (timing information and other supplemental data that may enhance usability of the decoded video signal but are not necessary for decoding the values of the samples in the video pictures).

[0114] Sequence and Picture Parameter Sets are necessary (must be correctly delivered by the underlying network) for a correct decoding of the video stream since they contain information that is referenced by every other Video Coding Layer and non - Video Coding Layer NALU.

[0115] A slice can be considered as a standalone decoding unit and consists into a set of macroblocks of a given picture. Unlike the rigid slice structure found in MPEG-2 (which reduces coding efficiency by increasing the quantity of header data and decreasing the effectiveness of prediction), slice sizes in H.264/AVC are highly flexible, as was the case earlier in MPEG-1.

[0116] Since it is always contained into a Network Adaptation Layer unit, a slice is typically transmitted separately from other ones of the same picture. Then, slicing allows the encoder to arrange information in different independent network units in order to limit the consequence of a transmission failure to a portion instead to the whole picture. Other important features included into the H.264/AVC standard that can be useful for error resilience/concealment purposes are Flexible Macroblock Ordering (FMO) and Data Partitioning.

[0117] A new ability to partition the picture into regions called slice groups has been developed, with each slice

Ex.1079 / IPR2026-00210 / Page 736 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

becoming an independently-decodable subset of a slice group. When used effectively, flexible macroblock ordering can significantly enhance robustness to data losses by managing the spatial relationship between the regions that are coded in each slice.

[0118] Since some coded information for representation of each region (e.g., motion vectors and other prediction information) is more important or more valuable than other information for purposes of representing the video content, H.264 allows the syntax of each slice to be separated into up to three different partitions for transmission, depending on a categorization of syntax elements. It is important to point out that H.264 Data Partitioning makes a categorization on different syntax elements within the same picture region, based on the damage that a loss of the slice would produce.

[0119] US-B-6611674 describes a method for adjusting video coding parameters, in particular the intra refresh rate, depending on wireless link conditions. However, the link conditions are estimated based only on signal to interference ratio or signal to noise ratio, which represent only link local quality measures. This method has two main drawbacks: i) it may be difficult for an application (video encoder) to retrieve such statistics since these are kept in the modem and ii) there is no way to detect adverse conditions in the remote wireless link.

[0120] In US-A-20020054578 a cross-layer approach for adapting multimedia streaming resource allocation to varying channel conditions in a 3G Wideband Code Division Multiple Access (W-CDMA) system is described. Such an approach can either minimize distortion or power and specifically targets hybrid delay-constrained Automatic Repeat Request and Forward Error Correction mechanisms that are applied to base layers and enhancements layers of a scalable video stream. In particular, the adaptation of the system consists of a dynamic allocation of bits to source coding and channel coding depending on measured channel conditions. Source coding bitrate is varied using Fine Grained Scalability.

Object and summary of the invention

[0121] The object of the present invention is thus to provide a method for adapting the parameters of a video coder to the wireless channel conditions that allows for easy and fast retrieval of channel condition information. By using information available in the header compressor, the video coder can estimate which video packets have been lost in the wireless link and avoid error propagation. Different video packetization strategies are suggested depending on the header compression mode being used.

[0122] According to the present invention, the above object is achieved by means of a method having the features set forth in the claims that follow. The invention also relates to a corresponding system, a related network as well as a related computer program product, loadable in the memory of at least one computer and including software code portions for performing the steps of the method of the invention when the product is run on a computer . As used herein, reference to such a computer program product is intended to be equivalent to reference to a computer-readable medium containing instructions for controlling a computer system to coordinate the performance of the method of the invention. Reference to "at least one computer" is evidently intended to highlight the possibility for the present invention to be implemented in a distributed/modular fashion.

[0123] The arrangement described herein proposes a method to exploit information on the link quality derived for example from the header compressor and consequently change video coding parameters in order to optimize video quality at the receiver.

[0124] A new method for adapting the parameters of a video coder to the wireless channel conditions, based on feedback coming from a Robust Header Compression compressor, is here proposed. In fact, Robust Header Compression uses acknowledgement messages, in particular Negative Acknowledgement messages, in case of unsuccessful header reconstruction, which indicates the loss of a packet carrying video payload. Such information can be used by the video coder to trigger proper error recovery techniques.

[0125] When applied to a mobile terminal, this technique improves the quality of IP-based video communications even when the peer device does not run an equivalent algorithm.

[0126] As far as video coding is concerned, reference is made to emerging H.264 standard ("Draft ITU-T Recommendation and Final Draft International Standard of Joint Video Specification (ITU-T Rec. H.264 ISO/IEC 14496-10 AVC)"), which has been designed for delivery of packet-based networks. However, the same concept can be applied to other standards as well, like for example MPEG-4.

[0127] The method of the invention thus propose to estimate link quality based only on layer-2 (header compressor) and layer-4 Realtime Transport Protocol information, which are more easily accessible and provide end-to-end quality estimation.

Brief description of the annexed drawings

[0128] The invention will now be described, by way of example only, by referring to the enclosed figures of drawing, wherein:

Ex.1079 / IPR2026-00210 / Page 737 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

- Figure 1 shows a block diagram of the compression operations,
- Figure 2 shows a block diagram of the compressor states,
- Figure 3 shows a block diagram of the decompressor states,
- Figure 4 shows the proposed system architecture,
- Figure 5 shows the sequence diagram of optimistic mode packet loss detection,
- Figure 6 shows the sequence diagram of reliable mode packet loss detection,
- Figure 7 shows a block diagram of a mobile phone suitable for implementing the proposed method.

Detailed description of preferred embodiments of the invention

[0129] The goal of the present arrangement is the optimization of an IP-based video-call application between two terminals, in which at least one of them is a mobile one.

[0130] A system architecture is depicted in Figure 4 for further reference, where a mobile terminal 100, corresponding to the User Equipment cited in the standard, is shown. Such a mobile terminal 100 communicates through a local link 114 with a base station 113, that in its turn is communication with a controller network 120, according to a typical mobile telecommunication architecture. A further remote mobile terminal 104 is shown, communicating with a remote base station 113 through a remote link 116, and thereby connected to the controller network 120. Also a fixed terminal 102 is shown, that can communicate with the controller network 120 through a Internet network 118.

[0131] The video-call application can either run between the mobile terminal 100 and the fixed terminal 102 or between the mobile terminals 100 and 104. The present invention applies to both cases.

[0132] Although a Universal Mobile Telecommunications System cellular architecture has been used as a reference, the method described is applicable also to other wireless communication systems, like, for example, General Packet Radio Service - Enhanced Data rates for Global Evolution (GPRS - EDGE) or Wireless LAN (Local Area Network).

[0133] If the mobile terminal 100 and the remote mobile terminal 104 are having a bi-directional video-call, they are generating Realtime Transport Protocol flows RTP_1 106 and RTP_2 108 respectively and they receive corresponding Real-time Transport Control Protocol $RTCP\text{-}RR_1$ Receiver Reports (RR) message, indicated with the arrow 110 in Figure 4, and $RTCP\text{-}RR_2$ Receiver Reports message, indicated with the arrow 112, in the reverse direction. Each Real-time Transport Control Protocol Receiver Reports message carries statistical information such as lost packets and jitter. Mobile terminals 100 and 104 compress Realtime Transport Protocol packet headers on the wireless link according to the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol profile.

[0134] From the point of view of the local mobile terminal 100, the goal is optimizing the RTP_1 flow 106 to the remote mobile terminal 104, on the basis of the conditions of the links, composing a wireless channel, that such RTP_1 flow 106 must cross, i.e. the local link 114 and the remote link 116 and possibly the Internet 118.

[0135] There may be critical conditions (Radio Frequency nulls, high Bit Error Rate, interference...) in the local link 114, remote link 116 or both. Furthermore, there may be congestion in the core Internet 120.

[0136] Consequently, different ways of detecting such conditions at the mobile terminal 100, are defined as shown in Table 8.

Table 8

Error link	Detection technique	Responsiveness
Local link 114	ROHC feedback (NACKs)	Immediate
Remote link 116	$RTCP\text{-}RR_1$ messages	Slow
Local and remote link (all)	Combinations of the above	

[0137] The terminal that is transmitting video, i.e. the local mobile terminal 100, can detect a critical condition in the local wireless link 114 with the base station 113, by the reception of Negative Acknowledgement generated by the Robust Header Compression decompressor in the Universal Terrestrial Radio Access radio network controller.

[0138] The Robust Header Compression decompressor (using the optimistic or reliable mode) generates a Negative Acknowledgement (NACK) message when a number of the Cyclic Redundancy Check of the received compressed headers fail and the Realtime Transport Protocol headers cannot be correctly reconstructed.

[0139] The rate of reception of Robust Header Compression Negative Acknowledgement messages can be used by the local mobile terminal 100 to: i) detect a generic critical condition in the local wireless link and ii) keep track of which video packets have been lost.

[0140] The second case is especially important because such information can be fed back to the video encoder to prevent error propagation at the receiver.

[0141] In order to detect that the link of the receiver, i.e. the remote mobile terminal 104, is experiencing packet

Ex.1079 / IPR2026-00210 / Page 738 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

losses, Real-time Transport Control Protocol Receiver Reports messages may be used, which explicitly include a packet loss rate indication. The responsiveness depends on the total bandwidth allocated to the Realtime Transport Protocol flow. Indeed, it is specified (RFC 3550) that the fraction of the session bandwidth for Real-time Transport Control Protocol is 5%.

[0142] The Robust Header Compression framework, as previously mentioned, supports multiple operating modes, based on the presence and utilization of a feedback channel from the header decompressor back to the header compressor.

[0143] Although the methods described hereafter refer to Robust Header Compression profile 1 (Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol), the same concepts can also be applied to other Robust Header Compression profiles, for example Transport Control Protocol / Internet Protocol.

[0144] When operating in optimistic mode, the Robust Header Compression framework minimizes the feedback channel usage. The decompressor in full context state (which should be the normal operating mode after an initial set-up phase) sends a Negative Acknowledgement packet back to the compressor when all the following conditions are verified:

- a Cyclic Redundancy Check fails,
- Sequence Number Least Significant Bit wraparound correction fails, and
- Local context repair fails.

[0145] In case of many consecutive packets being lost there is a high probability of a context damage and consequent Negative Acknowledgement generation. In O-mode the window size w is 16 for the coded Realtime Tansport Protocol - Sequence Number values (when UO-0 packets are used); therefore any link outage that causes the loss of at least 16 packets is likely to trigger a Negative Acknowledgement.

[0146] This observation suggests that application data should be segmented into a higher number of packets in order to improve loss detection capability, at the cost of slightly reduced compression efficiency. Such a penalty is limited when using small Context ID space and UO-0 packets, leading to a minimum header dimension of only one or two bytes.

[0147] Figure 5 shows an example of the operation of a compressor 204 and a decompressor 202 according to the invention.

[0148] The compressor 204 sends a sequence of P (prediction) frames and I (intra) frames. Once the compressor 204 receives a Negative Acknowledgement 200 it transits to a lower state and sends suitable packets to update the context (UOR-2, IR-DYN or IR). As can be seen from figure 5, this corresponds to sending I frames. Such packets further reduce compression efficiency, but they are necessary to re-establish a valid context at the decompressor 202 after a prolonged link outage.

[0149] If the Robust Header Compression decompressor 202 informs the video encoder about the packet loss event, suitable techniques can be used to mitigate video quality degradation at the receiver.

[0150] It should be noted, however, that the decompressor 202 may be able to recover damaged context information without sending a Negative Acknowledgement 200, so the optimistic mode does not guarantee 100% packet loss detection.

[0151] The video coder is operating at 10 frames per second and generates 10 packets per frame (with a variable dimension depending on frame type I or P).

[0152] In these conditions a burst of errors affecting at least 16 packets (~160ms on average) will cause the decompressor 202 to transmit a Negative Acknowledgement packet 200 (Robust Header Compression feedback-2 packet, 2 bytes minimum). Upon receiving such Negative Acknowledgement indication 200, the Robust Header Compression compressor 204 informs the video encoder, which triggers an Intra-refresh 212 operation.

[0153] In Reliable mode, the Robust Header Compression framework uses the feedback channel more frequently: acknowledgement packets are transmitted whenever the context is successfully updated.

[0154] In particular, in Figure 6 the Robust Header Compression decompressor 202 generates an Acknowledge (ACK) message 210 (Robust Header Compression feedback-1 packet, one byte minimum) in the following cases:

- the first of a sequence of R-0-CRC packets is correctly decompressed;
- the first N packets out of a sequence of UOR-2, IR or IR-DYN packets are successfully decompressed, where the default value for N is 2.

[0155] The decompressor 202 should ensure that at least one Acknowledge packet 210 per round trip time is generated, whereas the "sparse Acknowledge" mechanism tries to reduce the number of Acknowledges that are generated.

[0156] The Acknowledge packet 210 carries the Sequence Number of the packet that triggered the Acknowledge event.

[0157] In this case, preferably larger packets (that update the Robust Header Compression context) should be used

Ex.1079 / IPR2026-00210 / Page 739 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

in order to force the decompressor 202 to generated Acknowledge packets 210, at the cost of a higher radio bandwidth used for this purpose.

[0158] The transmitting side can therefore use two strategies to detect packet loss and consequently take countermeasures in the video encoder.

[0159] First, it can track the Robust Header Compression Acknowledge inter-arrival rate and, based on the measured average and variance, set a timeout T. This timeout T is set each time a Robust Header Compression Acknowledge is received. Upon timeout expiration, the transmitter assumes that the Acknowledge has not been generated due to a packet loss.

[0160] Second, the transmitter side keeps track of Sequence Numbers of Acknowledge packets (these sequence numbers are carried in the Robust Header Compression Acknowledge packet) and can easily detect gaps.

[0161] Whenever packet loss is detected by using the RoHC framework, the video encoder can react to mitigate video quality degradation, as discussed below.

[0162] Conversational services are mainly characterized by the fact that the end-to-end delay should be less then 150 ms, which leads to unavoidable transmission errors. Thus, an error-resilient video coding standard suitable for conversational communication has to minimize the visual effect of errors within one frame, whereas at the same time the well-known problem of spatial-temporal error propagation has to be limited.

[0163] H.264 video encoding is based on sequential encoding of N frames. Moreover, within each frame video encoding is based on sequential encoding of M macroblocks, where M is the total number of macroblocks in one frame and depends on the spatial resolution of the video sequence.

[0164] The encoding process then creates slices by grouping a certain number of macroblocks, the picture and macroblock indexes being binary coded in the slice header. The coded representation of a slice is the payload of a Network Adaptation Layer unit, which in turn is encapsulated in a Realtime Transport Protocol packet.

[0165] Sliced-structured coding is an error resiliency tool that helps in reducing packet loss probability and the corresponding visual degradation.

[0166] Packet loss probability can be reduced if slices are relatively small, since the probability of bit errors is generally lower than for large packets.

[0167] Moreover, short packets reduce the amount of lost information, so that error concealment techniques can be applied more efficiently, although it has to be considered that the increased overhead associated with decreasing slice size might affect coding performance. Thus, careful selection of the packet size is necessary.

[0168] At the receiving side, the decoder is in charge of temporal and spatial localization of lost packets i.e., error detection. In particular, the decoder has to detect if an entire picture or one or more slices of a picture were lost. This can be done by checking frame and macroblock indexes in slice headers.

[0169] Once errors have been detected, error concealment tools may be applied by means of pixel-level processing techniques. For example, supposing that a macroblock has not been received, it can be concealed from the pixel values of spatially adjacent macroblocks.

[0170] The need also exists of taking into account that error resiliency, error detection and error concealment techniques may help in reducing the impact of errors on the video quality. However, since errors cannot be completely eliminated, the effects of spatial-temporal propagation may still become severe.

[0171] Considering a given macroblock MB_A of frame (n-1), and supposing that the set of macroblocks belonging to frame n and predicted from pixels of such given macroblock MB_A is given by a set $\{MB_j\}$, $j = 1, ..., k$, and further supposing that the given macroblock MB_A has not been received because of packet loss during transmission of frame (n-1), the decoder cannot then decode this macroblock, and error concealment is applied to estimate the given macroblock MB_A. However, such reconstruction leads to mismatches of the reference frame (n-1) between encoder and decoder. Thus, decoding of frame n causes the set $\{MB_j\}$ to suffer from error propagation.

[0172] If no information on missing macroblocks is available at the encoder, the only effective way to recover from error propagation is refreshing by coding intra frames, although it must be taken into account that the instantaneous bit-rate and the resulting delay would increase significantly.

[0173] On the other hand, if the encoder knows which macroblocks of frame (n-1) have been lost during transmission, error propagation can be avoided by forcing those macroblocks not to be used for prediction of macroblocks of frame n.

[0174] For each macroblock belonging to frame n, the encoder may then decide to use inter or intra coding according to efficiency considerations (H.264 allows intra encoding of single macroblock). The only difference compared to usual frame coding is that here frame (n-1), which is used as the reference frame to encode frame n, contains "forbidden macroblock" meaning that they cannot be used for prediction.

[0175] Information about missing macroblocks is usually available at the decoder side. Indeed, as explained above, error detection allows knowing which slices are missing. This implies that:

- a feedback channel is necessary in order to let the decoder sending the encoder a not-acknowledge message (Acknowledge) for missing slices,

Ex.1079 / IPR2026-00210 / Page 740 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

- the encoder receives Acknowledges on parts of frame n-d, where d is a delay which depends on the bandwidth available for the feedback channel.

[0176] As far as the second item is concerned, error tracking techniques have to be adopted by the encoder. The encoder attempts to track the error to obtain an estimate of the quality of frame n-1 at the decoder side, which serves as reference for frame n, so that proper error recovery to stop error propagation may be applied.

[0177] The Negative Acknowledgement sent by the Robust Header Compression decompressor located in the Universal Terrestrial Radio Access Radio Network Controller can be beneficially used to get information about macroblocks that have been lost with Realtime Transport Protocol packets transmitted in the local link. To do that, it is sufficient to create a map of macroblocks contained in each Realtime Transport Protocol packet.

[0178] Such a procedure involving support of the feedback channel is - not - known from H.264 standard. Moreover, its full support would not be possible with current transport and control protocols.

[0179] The proposal is thus made of exploiting Third Generation Partnership Project from Rel. 4 supports Robust Header Compression on Universal Mobile Telecommunications System networks so that the proposed technique is fully standard compliant and no modifications are required.

[0180] Another important aspect is that the Negative Acknowledgement from the Robust Header Compression decompressor may be much faster than the Negative Acknowledgement sent by the decoder through a possible differently built feedback channel. When this application-level feedback is available, it is obviously possible to combine it with RoHC feedback.

[0181] In particular, supposing that after the encoder has encoded frame (n-1), the corresponding Realtime Transport Protocol packets are transmitted from the mobile terminal 100 to the base station 113, when the last Realtime Transport Protocol packet has been sent, the video encoder starts encoding frame n.

[0182] It is observed that, if Negative Acknowledgements related to Realtime Transport Protocol packets of frame (n-1) are received before the encoder starts encoding frame n, no error tracking is needed to estimate frame (n-1) at the decoder side. The encoder has just to set forbidden macroblocks as described above in order to avoid error propagation.

[0183] In absence of a feedback channel, the encoder has no information about lost packets on the remote link. Thus, it is not possible to apply macroblock-based error recovery techniques, unless a feedback channel is available providing information on lost macroblocks. However, as explained previously, it is to be taken into account that this would not be a standard-compliant solution.

[0184] Therefore, intra frame refreshing should be applied to recover from error propagation when bad quality occurs in the remote link.

[0185] The reverse video flow that is being generated by the peer mobile terminal may be used to estimate the quality of the remote link. To do that, Realtime Transport Control Protocol Receiver Report messages of the reverse video flow, which explicitly include an Realtime Transport Protocol packet loss rate indication may be used, although the rate of generation of such reports is low.

[0186] In particular, the link quality estimation strategy summarized in Table 9 can be adopted.

	RTP packet loss (remote)	No RTP packet loss (remote)
ROHC NACK occurrence (local)	Bad local link, and bad remote link depending on RTP packet loss rate	Bad local link
No ROHC NACK occurrence (local)	Bad remote link	Good local and remote link

Table 9

[0187] A preferred embodiment of the present invention may be implemented in future mobile phones according to the schematics shown in Figure 7, for example on next-generation Nomadik platforms.

Ex.1079 / IPR2026-00210 / Page 741 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

[0188] Such a preferred embodiment basically provides for a procedure that runs in a main Central Process Unit 300 of the mobile phone and interacts with a video coder 310, which is usually implemented as a hardware accelerator. Such Central Process Unit 300 interacts with the video codec 310 by means of I/O registers 312, shared memory 314 and interrupts.

[0189] All the networking tasks (protocol stacks) run on the Central Process Unit 300 including the Robust Header Compression engine. Based on the detected link conditions, the video coder 310 parameters are dynamically written in its control registers.

[0190] A method for dynamically adapting video encoding characteristics in an IP-based mobile video call system has thus been presented that improves the received video quality in presence of varying wireless link conditions.

[0191] By exploiting information from the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol header compressor and by analyzing the reverse video stream, the terminal is able to adapt the video encoder parameters to the estimated channel conditions and therefore limit error propagation which degrades video quality.

[0192] The arrangement described herein can be used also in other contexts where IP-based video services are provided and RoHC is applicable. For instance, it can be used in EDGE (Enhanced Data Rates for GSM Evolution (EDGE)) or other CDMA mobile standards.

[0193] Consequently, without prejudice to the underlying principles of the invention, the details and the embodiments may vary, also appreciably, with reference to what has been described by way of example only, without departing from the scope of the invention as defined by the annexed claims.

Claims

1. A method for communicating video data on a channel in a packet-switched network, the method including the steps of performing at a terminal (100) compression (10; 204) of said video data in packets (106, 108) during a video coding operation, detecting wireless channel conditions and adapting control parameters of said video coding operation to said detected channel conditions, **characterized in that** said compression operation is a robust header compression operation (204) and said step of adapting control parameters of said video coding operation is performed as a function of information (200, 210, 110) about said wireless channel conditions detected on a feedback channel made available in a decompression step (202) associated to said compression operation (204).

2. The method of claim 1, **characterized in that** said channel is a wireless channel.

3. The method of claim 1, **characterized in that** said step of adapting the control parameters of the video coding operation includes triggering error recovery techniques.

4. The method of claim 3, **characterized in that** said error recovery techniques include transmitting in response to said information (200, 210, 110) about said channel conditions video data related to context (30).

5. The method of any of the preceding claims, **characterized in that** said information (200, 210, 110) detected on a feedback channel is sent in said robust header compression operation from a header decompressor (202) to a header compressor (204).

6. The method of claim 5, **characterized in that** said information (200, 210, 110) sent on a feedback channel includes received packet acknowledgment messages (200, 210).

7. The method of claim 6, **characterized in that** said information (200, 210) sent on a feedback channel pertains a local link (114) of said channel between said terminal (100) and the network (120).

8. The method of claim 7, **characterized in that** said feedback channel further include a reverse video data flow (108) from a remote terminal (104) said information sent on a feedback channel includes a part wireless channel between said remote terminal (104) and said network (120).

9. The method of claim 8, **characterized in that** said part (110) pertaining a remote link (118) comprises messages including packet loss rate indication, in particular Real-time Transport Control Protocol Receiver Reports messages sent by said remote terminal (104) in said reverse video flow (108).

10. The method of one of claims 7 to 9,
characterized in that said information (110) sent on a feedback channel includes a rate of reception of robust

Ex.1079 / IPR2026-00210 / Page 742 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

header compression negative acknowledgement messages (200) used to keep track of which video packets (106) are lost.

11. The method of any of the preceding claims, **characterized in that** said compression operation (204) includes a first mode of operation suitable for minimizing said feedback channel usage that provides for sending a negative acknowledgement message (200) to the compressor (204) when one or more the following conditions are verified:

- a Cyclic Redundancy Check fails,
- Sequence Number Least Significant Bit wraparound correction fails, and
- Local context repair fails.

12. The method of claim 11, **characterized in that** when the compressor (204) receives a negative acknowledgement message (200) transits to a lower state and triggers an intra-refresh operation (212).

13. The method of any of the preceding claims, **characterized in that** said compression operation includes a second mode of operation in which an acknowledge message (210) is generated in the following cases:

- the first of a sequence of R-0-CRC packets is correctly decompressed;
- the first N packets in a sequence of UOR-2, IR

or IR-DYN packets are successfully decompressed; such an acknowledge message (210) also carrying a sequence number of the packet (106) that caused its generation.

14. The method of claim 13, **characterized in that** said step of adapting the control parameters of the video coding operation includes detecting packet loss by tracking a robust header compression acknowledge message (210) inter-arrival rate and setting a timeout (T) depending from said inter-arrival rate parameters, said timeout (T) being set each time a robust header compression acknowledge message (21) is received and assuming upon timeout expiration that said acknowledge message (210) does not indicate a packet loss.

15. The method of either claim 13 or 14, **characterized in that** said step of adapting the control parameters of the video encoding operation includes detecting packet loss by keeping track of sequence numbers of acknowledge message (210) packets.

16. The method of any of the preceding claims, **characterized in that** further includes an error recovery procedure on the local link (114) including the steps of mapping macroblocks contained in each real time packet and using said information (200, 210, 110) sent on the feedback channel in said compression operation for obtaining information about macroblocks that have been lost in real time packets (106) transmitted on said local link (114).

17. The method of claim 15 or 16, **characterized in that** said error recovery procedure includes setting forbidden macroblocks at the compressor (204) in order to avoid error propagation.

18. The method of claim 16 or 17, **characterized in that** said information sent on the feedback channel comprises a negative acknowledgement message (200) sent by the robust header compression decompressor (202) located in a Universal Terrestrial Radio Access Radio Network Controller (120) connected to said local link (114)

19. The method of any of the previous claims, **characterized in that** further includes evaluating a combination of said part (110) pertaining a remote link including messages including packet loss rate indication and of said acknowledgment messages (200, 210) sent from the header decompressor to the header compressor for estimating the wireless channel conditions.

20. The method of any of the preceding claims, **characterized in that** said robust header compression operation is a Robust Header Compression profile 1 according to Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol.

21. The method of any of the preceding claims, **characterized in that said** robust header compression operation follows Transport Control Protocol / Internet Protocol.

Ex.1079 / IPR2026-00210 / Page 743 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

22. The method of any of the preceding claims, **characterized in that** said video coding operation operates according the H.264 standard.

23. System for communicating video data on a channel of a packet-switched network, that includes a video coder (310) associated to a compressor module (10; 204) configured for compressing in packets (106, 108) said video data, said video coder (310) being suitable for adapting control parameters to wireless channel conditions, **characterized in that** said video coder (310) is suitable for operating according to said step of adapting control parameters of the method of claims 1 to 22.

24. The system of claim 23, **characterized in that** said channel is a wireless channel.

25. The system of claim 23, **characterized in that** said compressor module (204) operates according the robust header compression operation of claims 1 to 22.

26. The system of claim 25, **characterized in that** includes a decompressor module (202) that operates according the robust header compression of claims 1 to 21.

27. The system of claim 25 or 26, **characterized in that** said video coder (310) is implemented as a hardware accelerator.

28. The system of any of claims 25 to 27, **characterized in that** is associated to a wireless mobile terminal (100, 104).

29. The system of claim 28, **characterized in that** said video coder (310) interacts with a main Central Process Unit (300) of said mobile terminal (100).

30. The system of claim 29, **characterized in that** said robust header compression engine run on a Central Process Unit (300) and said video coder (310) control parameters are dynamically written in control registers of said video coder (310).

31. Network for communicating video data on wireless channel, **characterized in that** includes at least one compressor (204) and/or a decompressor operating according the method of claims 1 to 22.

32. The network of claim 31, **characterized in that** is associated to a internet-type network (118).

33. A computer program product, directly loadable in the memory of at least one computer and including software code portions for performing the steps of the method of claims 1 to 22 when the product is run on a computer.

Ex.1079 / IPR2026-00210 / Page 744 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Fig. 1

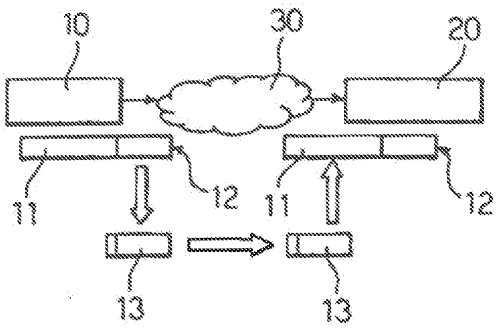


Fig. 2

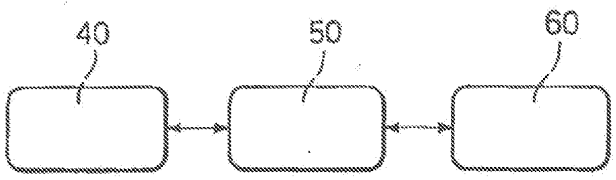
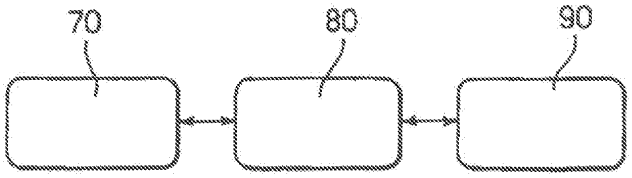


Fig. 3



Ex.1079 / IPR2026-00210 / Page 745 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Fig. 4

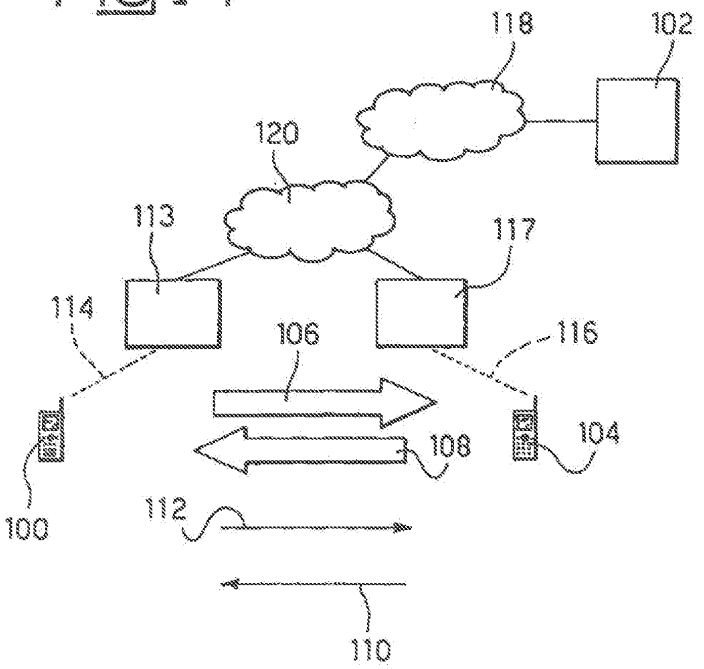
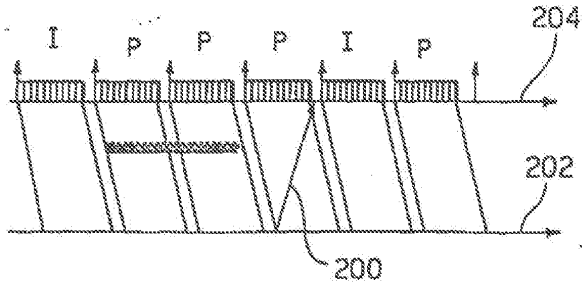


Fig. 5



Ex.1079 / IPR2026-00210 / Page 746 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Fig. 6

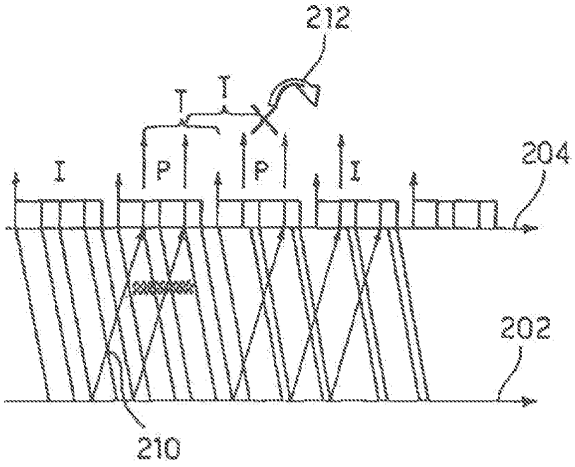
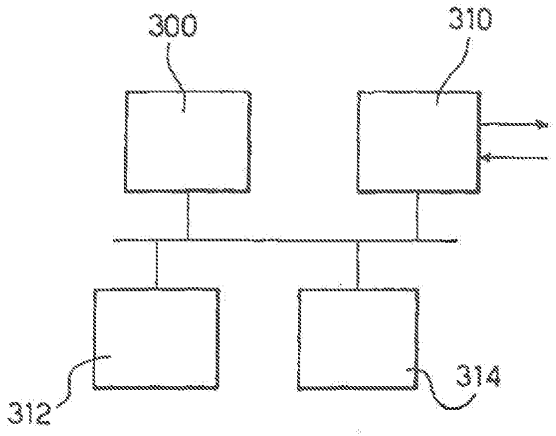


Fig. 7



Ex.1079 / IPR2026-00210 / Page 747 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 01 2878

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 November 2004	Rampson, F

CATEGORY OF CITED DOCUMENTS
X : particularly relevant if taken alone
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A : technological background
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Ex.1079 / IPR2026-00210 / Page 748 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 November 2004	Hampson, F

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X : particularly relevant if taken alone
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Ex.1079 / IPR2026-00210 / Page 749 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 01 2878

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 November 2004	Hampson, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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T : theory or principle underlying the invention
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Ex.1079 / IPR2026-00210 / Page 750 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 01 2878

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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02-11-2004

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Ex.1079 / IPR2026-00210 / Page 751 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

REC'D NOV 03 2011

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 26 OCTOBER 2011 (26.10.2011)
Applicant's or agent's file reference DAMA-30,559	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/024870**	International filing date *(day/month/year)* **15 FEBRUARY 2011 (15.02.2011)**

Applicant

DAMAKA, INC. et al

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

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For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

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Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8755

Form PCT/ISA/220 (July 2010)

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Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

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ID : PCT international application number
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PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,559		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/024870	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
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3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
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   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
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   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/024870

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/28(2006.01)i, G06F 15/173(2006.01)i, H04L 29/06(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 12/28; G06F 15/16; H04L 11/00; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: private, public, and relay routes , public address ,reflector, NAT device

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	J. ROSENBERG et al. "Session Traversal Utilities for NAT (STUN)", draft-ietf-behave-rfc3489bis-06, March 5, 2007. See Abstract, sections 5, 12.2, 13.2.3.	1-20
A	US 7623516 B2 (CHATURVEDI, SIVAKUMAR R. et al.) 24 November 2009 See whole document.	1-20
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A	US 7590758 B2 (TAKEDA, YUTAKA et al.) 15 September 2009 See whole document.	1-20
A	US 2006-0182100 A1 (LI, JIN et al.) 17 August 2006 See whole document.	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 OCTOBER 2011 (26.10.2011)	**26 OCTOBER 2011 (26.10.2011)**

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Authorized officer
KWON, Ho Young
Telephone No. 82-42-481-8478

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/024870

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		WO 2004-063843 A3	31.03.2005
		WO 2004-064356 A2	29.07.2004
		WO 2004-064356 A3	29.07.2004

Ex.1079 / IPR2026-00210 / Page 757 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/024870

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0182100 A1	17.08.2006	US 7912046 B2	22.03.2011

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**26 OCTOBER 2011 (26.10.2011)**
Applicant's or agent's file reference DAMA-30,559	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024870	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/28(2006.01)i, G06F 15/173(2006.01)i, H04L 29/06(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 OCTOBER 2011 (26.10.2011)	KWON, Ho Young Telephone No.82-42-481-8478

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Ex.1079 / IPR2026-00210 / Page 760 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: J. ROSENBERG et al. "Session Traversal Utilities for NAT (STUN)", draft-ietf-behave-rfc3489bis-06, March 5, 2007
D2: US 7623516 B2 (CHATURVEDI, SIVAKUMAR R. et al.) 24 November 2009
D3: US 7623476 B2 (RAVIKUMAR, SIVAKUMAR et al.) 24 November 2009
D4: US 7590758 B2 (TAKEDA, YUTAKA et al.) 15 September 2009
D5: US 2006-0182100 A1 (LI, JIN et al.) 17 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1 Claims 1-5

D1 is regarded as the closest prior art to the subject matter of claim 1. The subject matter of claim 1 differs from that of D1 in that the method in claim 1 comprises "receiving, by the first endpoint, a first private presence message, a first public presence message, and a first relay presence message from the second endpoint via private, public, and relay routes, respectively, wherein the private route corresponds to a local address assigned to the first endpoint by a network address translation (NAT) device in a local network, the public route corresponds to a public address of the NAT device, and the relay route uses a reflector", "sending to the second endpoint by the first endpoint", "sending a second private presence message", "receiving a second response from the second endpoint to one of the second private, public, or relay message by the first endpoint", "selecting the private, public, or relay route by the first endpoint", and "identifying the private, public, or relay route". These features of claim 1 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 1 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 1 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 1 is considered to involve an inventive step under PCT Article 33(3).

Claims 2-5 are dependent on claim 1 and as such also meet the requirements of PCT Article 33(2) and 33(3).

1.2 Claims 6-18

D1 is regarded as the closest prior art to the subject matter of claim 6. The subject matter of claim 6 differs from that of D1 in that the method in claim 6 comprises "sending, by the first endpoint, a first presence message to the second endpoint via a first route", "sending, by the first endpoint, a second presence message to the second endpoint via a second route", and "receiving a response from the second endpoint to one of the first and second presence messages, wherein the response identifies which of the first and second presence messages is being answered by the response". These features of claim 6 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 6 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 6 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 6 is considered to involve an inventive step under PCT Article 33(3).

Claims 7-18 are dependent on claim 6 and as such also meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 761 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

According to the requirements of PCT Rule 11.13(k), the different figures shall be numbered in Arabic numerals consecutively and independently of the numbering of the sheet. This requirement is not met in view of the use of FIG. 2a, FIG. 2b, FIG. 2c, FIG. 2d, FIG. 2e, FIG. 2f, FIG. 2g, FIG. 3a, FIG. 3b, FIG. 19A, FIG. 19B, FIG. 23A, FIG. 23B.

Ex.1079 / IPR2026-00210 / Page 762 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box V

1.3 Claims 19-20

D1 is regarded as the closest prior art to the subject matter of claim 19. The subject matter of claim 19 differs from that of D1 in that the endpoint in claim 19 comprises "sending first and second presence messages via first and second routes", "receiving a first response from the other endpoint to one of the first and second presence messages", "selecting the first or second route that corresponds to the first or second presence message, respectively", "receiving a third presence message via one of the first and second routes", "sending a second response to the third presence message to the other endpoint via the first or second route". These features of claim 19 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 19 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 19 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 19 is considered to involve an inventive step under PCT Article 33(3).

Claims 20 is dependent on claim 19 and as such also meets the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

The subject matter of claims 1-20 has industrial applicability and meets the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS TX 75374-1715 USA

PCT REC'D NOV 21 2011

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 09 NOVEMBER 2011 (09.11.2011)
Applicant's or agent's file reference DAMA-30,563	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/028685**	International filing date *(day/month/year)* **16 MARCH 2011 (16.03.2011)**
Applicant **DAMAKA, INC. et al**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer COMMISSIONER Telephone No. 82-42-481-8752

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **DHQFHXJR**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,563		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/028685	**16 MARCH 2011 (16.03.2011)**	19 MARCH 2010 (19.03.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/028685

A. CLASSIFICATION OF SUBJECT MATTER

H04L 9/32(2006.01)i, H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 9/32; H04N 7/173; H04N 7/167; H04L 12/28; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: virtual endpoint, peer to peer, login and authentication.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0080392 A1 (WALSH, RICHARD J et al.) 03 April 2008 See abstract, figures 1-3A,3D,4,7,9, paragraphs [0027]-[0030],[0032],[0034]-[0036],[0039],[0042]-[0044],[0061]-[0063],[0067],[0108]-[0111] and claims 1, 14,15,23.	1-20
A	US 2006-0218624 A1 (RAVIKUMAR, SIVAKUMAR et al.) 28 September 2006 See abstract, figures 12,13,31a, paragraphs [0099],[0102]-[0104],[0195]-[0197] and claims 1-7.	1-20
A	US 2009-0300673 A1 (BACHET, FRANCK et al.) 03 December 2009 See abstract, figures 2,6,7,9,17,25 and paragraphs [0059],[0062],[0355],[0363],[0376],[0449],[0450],[0498]-[0505].	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 NOVEMBER 2011 (08.11.2011)	**09 NOVEMBER 2011 (09.11.2011)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Yang, Jong Phil Telephone No. 82-42-481-8595

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/028685

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0080392 A1	03.04.2008	CN 101542461 A	23.09.2009
		EP 2069952 A2	17.06.2009
		KR 10-2009-0080051 A	23.07.2009
		WO 2008-042534 A2	10.04.2008
		WO 2008-042534 A3	06.11.2008
US 2006-0218624 A1	28.09.2006	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007

Ex.1079 / IPR2026-00210 / Page 768 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/028685

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-134263 A3	23.10.2008
US 2009-0300673 A1	03.12.2009	EP 2044771 A2	08.04.2009
		WO 2008-012488 A2	31.01.2008
		WO 2008-012488 A3	31.01.2008

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**09 NOVEMBER 2011 (09.11.2011)**
Applicant's or agent's file reference: DAMA-30,563	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/028685	**16 MARCH 2011 (16.03.2011)**	19 MARCH 2010 (19.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/32(2006.01)i, H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [X] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	08 NOVEMBER 2011 (08.11.2011)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2008-0080392 A1 (WALSH, RICHARD J et al.) 03 April 2008
D2: US 2006-0218624 A1 (RAVIKUMAR, SIVAKUMAR et al.) 28 September 2006
D3: US 2009-0300673 A1 (BACHET, FRANCK et al.) 03 December 2009

1. Novelty and Inventive Step

The subject matter of claims 1, 12 and 18 differs from the documents D1-D3 in that a mapped endpoint lacks the functionality needed to communicate directly with a peer-to-peer network (or the mapped endpoint is incompatible with the peer-to-peer network). Accordingly, claims 1, 12 and 18 are not anticipated by any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.

Thus, **claims 1, 12 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 2-11, 13-17 and 19-20 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 1, 12 and 18, respectively.**

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

Ex.1079 / IPR2026-00210 / Page 772 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 11, dependent on claim 1, is worded in reference to a method step of claim 1, "sending a message by the virtual endpoint to the mapped endpoint". However, said method step has not been worded in claim 1. Therefore, claim 11 does not meet the requirements of PCT Article 6.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	24 NOVEMBER 2011 (24.11.2011)
Applicant's or agent's file reference: DAMA-30,568	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No.: **PCT/US2011/029954**	International filing date *(day/month/year)*: **25 MARCH 2011 (25.03.2011)**

Applicant

DAMAKA, INC. et al

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR: Korean Intellectual Property Office, Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea	Authorized officer: COMMISSIONER
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8755

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **MNNR8WCP**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,568		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/029954	**25 MARCH 2011 (25.03.2011)**	29 MARCH 2010 (29.03.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/029954

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i, H04L 9/32(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/06; G06F 15/173; H04L 12/66; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: session, transition, switch, hand-over, SIP.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0003322 A1 (ISUMI, SHINYA) 01 January 2009 See abstract; figures 6, 9, 10; paragraphs [0011]-[0015]; claims 1-6.	1-20
A	US 2009-0327516 A1 (AMISHIMA, MAKI et al.) 31 December 2009 See abstract; figures 1, 4-19; claim 1.	1-20
A	EP 1848163 A1 (SHARP KABUSHIKI KAISHA) 24 October 2007 See abstract; figures 3-5; claims 1-14.	1-20
A	US 2006-0187926 A1 (IMAI, NAOKI) 24 August 2006 See abstract; figures 1, 4-6; claims 1-7.	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 NOVEMBER 2011 (24.11.2011)	**24 NOVEMBER 2011 (24.11.2011)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Kim Sun Jong Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/029954

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0003322 A1	01.01.2009	JP 04-434238 B2	08.01.2010
		JP 2009-005205 A	08.01.2009
		JP 4434238 B2	17.03.2010
US 2009-0327516 A1	31.12.2009	CN 101199230 A0	11.06.2008
		JP 04-664127 B2	14.01.2011
		JP 2006-352517 A	28.12.2006
		JP 4664127 B2	06.04.2011
		WO 2006-134803 A1	21.12.2006
EP 1848163 A1	24.10.2007	JP W020-060756 77A1	20.07.2006
		WO 2006-075677 A1	20.07.2006
US 2006-0187926 A1	24.08.2006	JP 2006-237815 A	07.09.2006

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**24 NOVEMBER 2011 (24.11.2011)**
Applicant's or agent's file reference: DAMA-30,568	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/029954	**25 MARCH 2011 (25.03.2011)**	29 MARCH 2010 (29.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i, H04L 9/32(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Ex.1079 / IPR2026-00210 / Page 780 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0003322 A1 (ISUMI, SHINYA) 01 January 2009
D2: US 2009-0327516 A1 (AMISHIMA, MAKI et al.) 31 December 2009
D3: EP 1848163 A1 (SHARP KABUSHIKI KAISHA) 24 October 2007
D4: US 2006-0187926 A1 (IMAI, NAOKI) 24 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1. In regard to claim 10, document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

A method for sweeping an active session exiting between a first endpoint and a second endpoint from the first endpoint to a third endpoint (see 'change the first communication to the second communication' in claim 1), the method comprising:
receiving, by the first end point, a go away message directly from the third end point (see 'receiving a call instruction' in claim 2); and
transferring, by the first endpoint, session information to the third endpoint, wherein the session information includes information needed by the third endpoint to enter the active session with the second endpoint (see 'employing the coding scheme stormed in the memory to perform ... call setting between the second and third IP phones' in claim 2).

However, D1 does not explicitly disclose the features of checking, by the first endpoint, a policy associated with the first endpoint to determine an action to be taken upon receipt of the go away message; and identifying, by the first endpoint, that the first endpoint is engaged in an active session with the second endpoint. In addition, these features of claim 10 are not disclosed in any other documents cited in the ISR, nor would they be obvious to a person skilled in the art. Therefore, claim 10 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2. Claims 1 and 18 include the essential features of claim 10, and the features of claims 1 and 18 essentially correspond to those defined in claim 10. Therefore, claims 1 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.3. Claims 2-9, 11-17, and 19-20 are dependent on claims 1, 10, and 18, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PCT/US2011/024891

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

REC'D DEC 12 2011

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference DAMA-30,562	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/024891**	International filing date *(day/month/year)* **15 FEBRUARY 2011 (15.02.2011)**
Applicant **DAMAKA,INC et al**	

Date of mailing *(day/month/year)* 25 NOVEMBER 2011 (25.11.2011)

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea	Authorized officer COMMISSIONER
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8752

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **U5NVMQP7**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,562		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/024891	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)
Applicant		
DAMAKA,INC et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Ex.1079 / IPR2026-00210 / Page 784 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/024891

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/06; H04B 7/00; H04L 12/26; H04L 12/28; H04J 3/24; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: session, NAT, peer-to-peer, endpoint, tunneling.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007-0019545 A1 (WADE R. ALT et al.) 25 January 2007 See abstract; figures 2, 4-15; paragraphs [0007]-[0011]; claims 1-8.	1-20
A	US 2005-0208947 A1 (PRADEEP BAHL) 22 September 2005 See abstract; figures 1, 4, 6; claims 1-11.	1-20
A	US 2007-0297430 A1 (PETRI NYKANEN et al.) 27 December 2007 See abstract; figures 1-5; claims 1-4.	1-20
A	US 2003-0214955 A1 (JUN-HYEONG KIM) 20 November 2003 See abstract; figures 3, 4; claims 1-10.	1-20
A	US 2005-0270992 A1 (AJIT SANZGIRI et al.) 08 December 2005 See abstract; figures 2, 3; claims 1-10.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 NOVEMBER 2011 (24.11.2011)	**25 NOVEMBER 2011 (25.11.2011)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Kim Sun Jong

Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2011/024891

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007-0019545 A1	25.01.2007	None	
US 2005-0208947 A1	22.09.2005	AT 412301 T	15.11.2008
		CN 1677976 A	05.10.2005
		CN 1677976 B	08.06.2011
		CN 1677976 C0	05.10.2005
		DE 602005010494 D1	04.12.2008
		EP 1578083 A1	21.09.2005
		EP 1578083 B1	22.10.2008
		JP 04-762581 B2	17.06.2011
		JP 2005-269661 A	29.09.2005
		KR 10-0953805 B1	21.04.2010
		KR 20060044435A	16.05.2006
		US 7457626 B2	25.11.2008
US 2007-0297430 A1	27.12.2007	US 2007-0271453 A1	22.11.2007
		US 2008-0005290 A1	03.01.2008
US 2003-0214955 A1	20.11.2003	JP 03-749720 B2	01.03.2006
		JP 2004-007671 A	08.01.2004
		KR 10-0485769 B1	28.04.2005
		KR 20030088723A	20.11.2003
		US 7796616 B2	14.09.2010
US 2005-0270992 A1	08.12.2005	US 7616613 B2	10.11.2009

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**25 NOVEMBER 2011 (25.11.2011)**
Applicant's or agent's file reference: DAMA-30,562	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024891	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA,INC et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2007-0019545 A1 (WADE R. ALT et al.) 25 January 2007
D2: US 2005-0208947 A1 (PRADEEP BAHL) 22 September 2005
D3: US 2007-0297430 A1 (PETRI NYKANEN et al.) 27 December 2007
D4: US 2003-0214955 A1 (JUN-HYEONG KIM) 20 November 2003
D5: US 2005-0270992 A1 (AJIT SANZGIRI et al.) 08 December 2005

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

D1 discloses a method for providing packetized communication services, the method comprising: receiving a request from a first endpoint of a first domain for establishing a communication session with a second endpoint of a second domain; and establishing a tunnel by a network address translation server to support the communication session, the network address translation server being controlled by a service provider as part of a managed communication service, the tunnel traversing a first firewall and a first network address translator of the first domain and a second firewall and a second network address translator of the second domain to reach the second endpoint; and encrypting the communication session for transport via the tunnel.

D2 discloses a method and mobile node that facilitate persisting virtual private network structures across multiple network addresses assigned to the mobile node. The method includes initially setting up a virtual private network tunnel between a mobile node and a virtual private network tunnel server.

D3 discloses a communication network for providing seamless peer-to-peer connectivity between nodes of different communication network environments, the communication network comprising at least one tunneling server comprising an access unit for providing access to the communication network and an addressing unit for assigning a dynamic address of a first addressing scheme routable in the communication network to a node connecting itself to the tunneling server, the node having a fixed address of a second addressing scheme, and storing at runtime an association between the fixed address of the second addressing scheme and the dynamic address of the first addressing scheme.

D4 discloses a network connection apparatus for communicating between a network device located in a first private network and a second private network located outside the first private network. The apparatus includes an address acquisition module capable of acquiring a public IP address of a network management device from a DNS based on a domain name of the network management device of the second private network.

D5 discloses a method for transferring information in a digital network, wherein the network includes a router, an access point, a user device, and a plurality of other devices all coupled to the network, the method comprising creating a multipoint tunnel communication mode to transfer information from the user device to at least one of the other devices; using a routing configuration to route communications over the multipoint tunnel; and modifying the routing configuration in response to a discovered host.

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 789 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:

Box V

1.1 In regard to claim 1, none of the documents D1 to D5 nor any combination thereof teaches or fairly suggests the features wherein "determining identifies that none of a private interface, a public interface, and a relay interface are available when using the first message protocol" and wherein "the private interface corresponds to a local address assigned to the first endpoint by a NAT device in a local network, the public interface corresponds to a public address of the NAT device that represents the first endpoint in networks outside of the local network, and the relay interface corresponds to a reflector located outside of the local network". Accordingly, it would not have been obvious to a person skilled in the art to apply the knowledge of D1 to D5 in order to create the method for establishing a peer-to-peer communication session between first and second endpoints according to claim 1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3).

1.2 The features of claim 9 essentially correspond to those of claim 1 in that the former are described from the viewpoint of a tunneling server and the latter from that of a first endpoint. Therefore, claim 9 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.3 The features of claim 15 essentially correspond to those of claim 1 except that their invention categories are different. Therefore, claim 15 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.4 Claims 2-8, 10-14, and 16-20 are dependent on claims 1, 9, and 15, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS TX 75374-1715 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference DAMA-30,572	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/031245**	International filing date *(day/month/year)* **05 APRIL 2011 (05.04.2011)**
Applicant **DAMAKA, INC. et al**	

Date of mailing *(day/month/year)* 26 DECEMBER 2011 (26.12.2011)

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea	Authorized officer COMMISSIONER
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8753

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **5U32JJEB**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,572		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/031245	**05 APRIL 2011 (05.04.2011)**	16 APRIL 2010 (16.04.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☒ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/031245

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 7
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. Accordingly, there is an inconsistency in the matter for which protection is sought. Therefore, claim 7 does not clearly define the matter for which protection is sought.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☐ No protest accompanied the payment of additional search fees.

Ex.1079 / IPR2026-00210 / Page 794 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/031245

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/66(2006.01)i, H04L 12/46(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/06; H04M 1/253; H04Q 7/00; H04M 7/12; H04L 12/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: PBX, voice call continuity, handover, celluar, network, SIP, gateway.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1988698 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008 See abstract; figure 6; paragraphs [0006]-[0008],[0018]-[0021].	1-6,8-21
A	US 2009-0052399 A1 (A. SILVER et al.) 26 February 2009 See abstract; figures 1,8,9; paragraphs [0003],[0004],[0021]-[0028].	1-6,8-21
A	US 2007-0206563 A1 (A. SILVER et al.) 06 September 2007 See abstract; figures 4,5,9,10,11; paragraphs [0006]-[0008],[0034]-[0049].	1-6,8-21
A	EP 1988697 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008 See abstract; figures 1-5; claims 1-9.	1-6,8-21

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 DECEMBER 2011 (26.12.2011)	**26 DECEMBER 2011 (26.12.2011)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer

Kim Sun Jong

Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/031245

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1988698 A1	05.11.2008	CA 2630130 A1	30.10.2008
		CN 101547415 A	30.09.2009
US 2009-0052399 A1	26.02.2009	WO 2009-026447 A1	26.02.2009
US 2007-0206563 A1	06.09.2007	EP 1989893 A2	12.11.2008
		EP 1994772 A2	26.11.2008
		US 2007-0206568 A1	06.09.2007
		US 2007-0206571 A1	06.09.2007
		US 2007-0206572 A1	06.09.2007
		US 2007-0206573 A1	06.09.2007
		US 2007-0206580 A1	06.09.2007
		US 2007-0206735 A1	06.09.2007
		US 2011-0051707 A1	03.03.2011
		US 2011-0075609 A1	31.03.2011
		US 2011-0081911 A1	07.04.2011
		US 2011-0090823 A1	21.04.2011
		US 2011-0116498 A1	19.05.2011
		US 7843901 B2	30.11.2010
		US 7873001 B2	18.01.2011
		US 7873032 B2	18.01.2011
		US 7890096 B2	15.02.2011
		US 7903635 B2	08.03.2011
		US 7974618 B2	05.07.2011
		US 8023479 B2	20.09.2011
		WO 2007-103121 A2	13.09.2007
		WO 2007-103121 A3	13.09.2007
		WO 2007-103125 A2	13.09.2007
		WO 2007-103125 A3	13.09.2007
		WO 2007-103127 A2	13.09.2007
		WO 2007-103127 A3	13.09.2007
		WO 2007-103127 A3	15.11.2007
		WO 2007-103129 A2	13.09.2007
		WO 2007-103129 A3	13.09.2007
		WO 2007-103140 A2	13.09.2007
		WO 2007-103140 A3	13.09.2007
		WO 2007-103217 A1	13.09.2007
		WO 2007-103218 A2	13.09.2007
		WO 2007-103218 A3	13.09.2007
		WO 2007-103238 A2	13.09.2007
		WO 2007-103238 A3	13.09.2007
		WO 2007-103238 A3	22.11.2007
		WO 2007-103269 A2	13.09.2007
		WO 2007-103269 A3	13.09.2007
EP 1988697 A1	05.11.2008	CA 2630101 A1	30.10.2008
		CN 101330763 A	24.12.2008

Ex.1079 / IPR2026-00210 / Page 796 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)* **26 DECEMBER 2011 (26.12.2011)**

Applicant's or agent's file reference
DAMA-30,572

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031245	**05 APRIL 2011 (05.04.2011)**	16 APRIL 2010 (16.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/66(2006.01)i, H04L 12/46(2006.01)i

Applicant

DAMAKA, INC. et al

I. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 DECEMBER 2011 (26.12.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 7

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international search *(specify)*:

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 7 are so unclear that no meaningful opinion could be formed *(specify)*:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for said claims Nos. 7

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

- ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

☐ See Supplemental Box for further details.

Ex.1079 / IPR2026-00210 / Page 799 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-6,8-21	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: EP 1988698 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008
D2: US 2009-0052399 A1 (A. SILVER et al.) 26 February 2009
D3: US 2007-0206563 A1 (A. SILVER et al.) 06 September 2007
D4: EP 1988697 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008

1. Novelty and Inventive step

1.1 Claim 1 relates to an enterprise network comprising:
- an enterprise private branch exchange (PBX) having a pilot number associated therewith, wherein the enterprise PBX is configured to communicate signaling information with a client of the enterprise network when the client is positioned in a cellular network that is separate from the enterprise network and is outside of the enterprise network's control, and wherein the enterprise PBX is further configured to communicate signaling information with an external device coupled to a PSTN that is external to the enterprise network;
- an enterprise IP-Public Switched Telephone Network (PSTN) media gateway configured to provide a first media path between the client and the enterprise IP-PSTN media gateway when the client is positioned in the cellular network, and further configured to provide a second media path between the enterprise IP-PSTN media gateway and the external device;
- a voice call continuity (VCC) Session Initiation Protocol (SIP) server configured to communicate with the enterprise PBX in order to perform signaling functions for the client via the enterprise PBX when the client is positioned in the cellular network, and further configured to communicate signaling information directly with the client when the client is positioned in an IP network that is separate from the enterprise network and is outside of the enterprise network's control; and
- a VCC media gateway configured to communicate with the enterprise IP-PSTN media gateway and the VCC SIP server and to receive digits corresponding to a destination number associated with the external device from the client after the client places a call to the pilot number, further configured to anchor the first and second media paths, and further configured to provide a third media path directly to the client when the client is positioned in the IP network and to anchor the third media path.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said enterprise network of claim 1, and the features of claim 1 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.2 Claims 2-5 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 800 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:

Box V

1.3 Claim 6 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call request at a pilot number of the enterprise network from a first device that is a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, and wherein the first device is located in a first communication network that is external to the enterprise network and not controlled by the enterprise network;
- receiving, by the enterprise network, a plurality of digits from the first device, wherein the plurality of digits provide contact information corresponding to a second device that is located in a second communication network that is external to the enterprise network and not controlled by the enterprise network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, and wherein the first and second media paths connect the first and second devices for the communication session,

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 6, and the features of claim 6 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 6 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.4 Claims 8-15 are dependent on claim 6 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claim 16 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call at a pilot number of the enterprise network from a second device that is not a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, wherein the call identifies a first device that is a client of the enterprise network as a destination, and wherein the first and second devices are both located in communication networks that are external to the enterprise network and are not controlled by the enterprise network;
- identifying, by the enterprise network, whether the first device is registered with the enterprise network as available to the enterprise network via an Internet Protocol (IP) network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network, and wherein the first media path is a cellular bearer path if the first device is not registered as available via the IP network and is an IP bearer path if the first device is registered as available via the IP network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, wherein the first and second media paths connect the first and second devices for the communication session.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 16, and the features of claim 16 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 16 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of :

Box V

1.6 Claims 17-21 are dependent on claim 16 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-6 and 8-21 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,814		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/040864	**17 JUNE 2011 (17.06.2011)**	18 JUNE 2010 (18.06.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/040864

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i, G06F 15/16(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/02; G06F 3/048; G06F 15/173; H04L 12/66; H04Q 11/00; G06F 9/46; H04M 3/42; G06F 15/177; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: buddy, transfer, forward, call, P2P, wireless, network, endpoint, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0250408 A1 (C. Y. TSUI et al.) 09 October 2008 See abstract; figures 4,5; paragraphs [51]-[54],[56].	1-20
A	US 2009-0136016 A1 (M. GORNOI et al.) 28 May 2009 See abstract; figure 4; paragraphs [60]-[70]; claims 1,7,22.	1-20
A	US 2006-0203750 A1 (S. RAVIKUMAR et al.) 14 September 2006 See abstract; figures 1,21; paragraphs [44],[124].	1-20
A	US 2008-0235362 A1 (S. KJESBU et al.) 25 September 2008 See abstract; figures 1A,1B; paragraphs [36],[37],[39]-[42],[64]-[67].	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 FEBRUARY 2012 (10.02.2012)	**17 FEBRUARY 2012 (17.02.2012)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Kim Sun Jong Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/040864

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0250408 A1	09.10.2008	CN 101711387 A	19.05.2010
		CN 101766015 A	30.06.2010
		KR 10-2009-0125264 A	04.12.2009
		KR 10-2010-0015362 A	12.02.2010
		US 2008-0248750 A1	09.10.2008
		US 2008-246439 A1	09.10.2008
		US 2008-246629 A1	09.10.2008
		US 2008-246734 A1	09.10.2008
		US 2008-248779 A1	09.10.2008
		US 2008-249969 A1	09.10.2008
		US 2008-261572 A1	23.10.2008
		WO 2008-124394 A1	16.10.2008
		WO 2008-124399 A1	16.10.2008
US 2009-0136016 A1	28.05.2009	None	
US 2006-0203750 A1	14.09.2006	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007

Ex.1079 / IPR2026-00210 / Page 806 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/040864

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134260 A3	15.01.2009
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007
US 2008-0235362 A1	25.09.2008	EP 2137926 A1	30.12.2009
		NO 2007145 1A	22.09.2008
		WO 2008-115077 A1	25.09.2008

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**17 FEBRUARY 2012 (17.02.2012)**
Applicant's or agent's file reference: DAMA-30,814	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/040864	**17 JUNE 2011 (17.06.2011)**	18 JUNE 2010 (18.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	10 FEBRUARY 2012 (10.02.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2008-0250408 A1 (C. Y. TSUI et al.) 09 October 2008
D2: US 2009-0136016 A1 (M. GORNOI et al.) 28 May 2009
D3: US 2006-0203750 A1 (S. RAVIKUMAR et al.) 14 September 2006
D4: US 2008-0235362 A1 (S. KJESBU et al.) 25 September 2008

1. Novelty and Inventive step

Regarding independent claim 1, document D1 which is considered to represent the most relevant state of the art discloses (the references in parentheses applying to this document):

a method for transferring a call in a hybrid peer-to-peer network comprising:
- receiving, by a first endpoint, an instruction to transfer a call to a second endpoint, wherein the first endpoint is engaged in the call with a third endpoint when the instruction is received (lines 10-17 in paragraph [51]);
- determining, by the first endpoint, whether the first endpoint has a buddy relationship with the second endpoint, wherein the first endpoint cannot transfer the call to the second endpoint unless the first and second endpoints have a buddy relationship because the buddy relationship is needed to provide permission by the second endpoint for the first endpoint to communicate with the second endpoint (paragraph [52]);
- sending, by the first endpoint, at least one transfer message to the second endpoint to transfer the call, wherein the at least one transfer message indicates that the first endpoint wants to transfer the call to the second endpoint and identifies the third endpoint as being involved in the call (paragraphs [52],[53]); and
- ending, by the first endpoint, the first endpoint's involvement in the call after the call is transferred (paragraphs [52],[56]).

The subject matter of claim 1 differs from that of D1 in that D1 does not disclose the features ofestablishing, by the first endpoint, a buddy relationship with the second endpoint if the first and second endpoints are not in a buddy relationship. In addition, this difference would not be obvious to a person skilled in the art over D1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2 The features of independent claim 10 essentially correspond to those of claim 1 in that the former are described from a second endpoint receiving a call transfer and the latter from that of a first endpoint performing a call transfer. Therefore, claim 10 meets the requirements of PCT Article
Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 810 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:

Box V

33(2) and 33(3) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.3 The features of independent claim 18 essentially correspond to those of claim 1 except that claimed categories are different to each other. Therefore, claim 18 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.4 Claims 2-9 are dependent on claim 1, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claims 11-17 are dependent on claim 10, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.6 Claims 19 and 20 are dependent on claim 18, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

Ex.1079 / IPR2026-00210 / Page 811 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,815		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/041565	**23 JUNE 2011 (23.06.2011)**	23 JUNE 2010 (23.06.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 4
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/041565

A. CLASSIFICATION OF SUBJECT MATTER

H04L 9/14(2006.01)i, H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, G06F 21/20(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 9/14; H04L 12/66; H04L 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: key, refresh, iteration, update, SIP and peer.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000. See the whole document.	1,5-10,12
Y	US 2008-0235511 A1 (O'BRIEN WILLIAM G. et al.) 25 September 2008	1,5-10,12
A	See abstract, figures 2,4a-6b and claims 1-13.	2-4,11,13-19
A	US 2010-0049980 A1 (BARRIGA LUIS et al.) 25 February 2010 See abstract and figures 5-6,8-10.	1-19

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 JANUARY 2012 (05.01.2012)	**05 JANUARY 2012 (05.01.2012)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Yang, Jong Phil

Telephone No. 82-42-481-8595

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/041565

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0235511 A1	25.09.2008	CA 2571891 A1	21.06.2008
US 2010-0049980 A1	25.02.2010	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**05 JANUARY 2012 (05.01.2012)**
Applicant's or agent's file reference: DAMA-30,815	**FOR FURTHER ACTION**: See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/041565	**23 JUNE 2011 (23.06.2011)**	23 JUNE 2010 (23.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/14(2006.01)i, H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, G06F 21/20(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	05 JANUARY 2012 (05.01.2012)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	2-4,11,13-19	YES
	Claims	1,5-10,12	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000.
D2: US 2008-0235511 A1 (O`BRIEN WILLIAM G. et al.) 25 September 2008
D3: US 2010-0049980 A1 (BARRIGA LUIS et al.) 25 February 2010

1. Novelty and Inventive Step

1.1 Claims 1-12

D1, which is considered to represent the most relevant state of the art to the subject matter of independent claim 1, discloses a method for changing an encryption key, the method comprising: receiving, by a first endpoint, an instruction to change from a first encryption key to a second encryption key; sending, by the first endpoint, a first message to a second endpoint that the first endpoint is going to change to the second encryption key, wherein the first message includes information representing the second encryption key; receiving, by the first endpoint, in response to the first message, a second message from the second endpoint indicating that the second endpoint received the first message; sending, by the first endpoint, a third message to the second endpoint acknowledging receipt of the second message; and changing, by the first endpoint, from the first encryption key to the second encryption key, wherein all incoming messages for the first endpoint are to be encrypted using the second encryption key (the technical features related to "Key refresh" and 'Finished' in the whole document of D1).

D1 does not disclose the feature, "the messages are defined for use with a transactional state model in a peer-to-peer network". However, it would be readily derived from the features in figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art. Accordingly, claim 1 is obvious over D1 in view of D2. Therefore, **claim 1 lacks an inventive step under PCT Article 33(3).**

The additional feature of claim 5, dependent on claim 1, would be readily derived from figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

The additional features of claims 6-7 and 10, dependent on claim 1, would be readily derived from the features related to "Key refresh" and 'Finished' of D1 and figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

<Continued on Supplemental Box>

Ex.1079 / IPR2026-00210 / Page 817 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of :

<Box No.V>

The additional features of claims 8-9, dependent on claim 7, are not explicitly disclosed in any of the documents D1-D3. However, they would be regarded as normal design options by a person skilled in the art.

The additional feature of claim 12, dependent on claim 1, are not explicitly disclosed in any of the documents D1-D3. However, it would be regarded as a normal design option by a person skilled in the art.

Therefore, **claims 5-10 and 12 lack an inventive step under PCT Article 33(3).**

The additional features of claims 2-4 and 11, dependent on claim 1, are not disclosed in any of the documents D1-D3, nor are they obvious to a person skilled in the art over the documents individually or in combination. Accordingly, **claims 2-4 and 11 are novel and involve an inventive step under PCT Article 33(2) and (3).**

1.2 Claims 13-19

The subject matter of claims 13 and 17 differs from the documents D1-D3 in the following features: receiving, by a first endpoint, an encrypted message from a second endpoint; applying a first key iteration of a second base encryption key to the encrypted message to determine if the first key iteration will decrypt the encrypted message; if the first key iteration will not decrypt the message, rotating the encryption key to form a next key iteration from the second based encryption key; and applying the next key iteration to the encrypted message to determine if the next key iteration will decrypt the encrypted message as long as untried key iterations are available, continuing the steps of rotating and applying for each key iteration until the message is decrypted.

Accordingly, claims 13 and 17 are not anticipated from any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.

Thus, **claims 13 and 17 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 14-16 and 18-19 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 13 and 17, respectively.**

2. Industrial Applicability

Claims 1-19 are industrially applicable under PCT Article 33(4).

Ex.1079 / IPR2026-00210 / Page 818 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,746		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/031246	**05 APRIL 2011 (05.04.2011)**	29 APRIL 2010 (29.04.2010)
Applicant		
DAMAKA, INC. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/031246

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L 29/06; H04L 12/66; H04Q 11/00; H04L 12/28; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: call, instant message, signaling information, routing.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005 See abstract; claims 1-3,5,8,9,14-17	1-24
A	US 2006-0203750 A1 (SIVAKUMAR RAVIKUMAR et al.) 14 September 2006 See claims 1,2,4-9	1-24
A	US 2006-0120375 A1 (SIVAKUMAR RAVIKUMAR et al.) 08 June 2006 See claims 1,2,5,16	1-24
A	US 2007-0165629 A1 (SIVAKUMAR CHATURVEDI et al.) 19 July 2007 See claims 1,2,14	1-24

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 DECEMBER 2011 (27.12.2011)	**28 DECEMBER 2011 (28.12.2011)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer YANG, CHAN HO Telephone No. 82-42-481-5689

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2011/031246

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0286519 A1	29.12.2005	AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 T	21.02.2008
		JP 2011-103121 A	26.05.2011
		MX 2007000141 A	15.04.2009
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
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		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
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		CA 2571754 A1	26.01.2006
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		JP 2008-505580 A	21.02.2008
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		US 2005-0286519 A1	29.12.2005
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Form PCT/ISA/210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2011/031246

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2006-0120375 A1	08.06.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
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US 2006-0120375 A1	08.06.2006	AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
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		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
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		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010

Ex.1079 / IPR2026-00210 / Page 822 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2011/031246

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
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		WO 2007-134261 A3	22.11.2007
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		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
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		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
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		US 2006-0203750 A1	14.09.2006
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		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A3	22.11.2007

Ex.1079 / IPR2026-00210 / Page 823 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**28 DECEMBER 2011 (28.12.2011)**
Applicant's or agent's file reference DAMA-30,746	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031246	**05 APRIL 2011 (05.04.2011)**	29 APRIL 2010 (29.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	27 DECEMBER 2011 (27.12.2011)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-24	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D2: US 2006-0203750 A1 (SIVAKUMAR RAVIKUMAR et al.) 14 September 2006
D3: US 2006-0120375 A1 (SIVAKUMAR RAVIKUMAR et al.) 08 June 2006
D4: US 2007-0165629 A1 (SIVAKUMAR CHATURVEDI et al.) 19 July 2007

(1) Novelty (N) and Inventive Step (IS)

The subject matter of claim 1, 10, and 18 differs from these prior art documents in establishing, by the first endpoint, at least one media route with the second endpoint to carry media for the call, wherein the at least one media route is established using the peer-to-peer hybrid network and not the third party instant message system. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1, 10, and 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 19-24 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

(2) Industrial Applicability (IA)

Claims 1-24 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,900		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/049000	**24 AUGUST 2011 (24.08.2011)**	25 AUGUST 2010 (25.08.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☒ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 3
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/049000

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

I. Claims 1-17 are directed to a method for receiving, by a first endpoint, a communication peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

II. Claims 18-22 are directed to a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/049000

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, G06F 15/16(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/02; G06F 15/16; H04L 9/28; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: hybrid, p2p, peer, join, access server, media server, sharing, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004-0148434 A1 (D. MATSUBARA et al.) 29 July 2004 See abstract; figures 1,2,4,5; paragraphs [0055]-[0058],[0071],[0072]; claims 1-15.	1-22
A	US 2009-0182815 A1 (J. CZECHOWSKI, III et al.) 16 July 2009 See abstract; figures 1,3,4,7,8; paragraphs [0023]-[0030],[0038],[0045], [0127]-[0129],[0134].	1-22
A	US 2007-0165629 A1 (S. R. CHATURVEDI et al.) 19 July 2007 See abstract; figures 1,2A; paragraphs [0043],[0044].	1-22
A	US 2008-0273541 A1 (A. PHARN) 06 November 2008 See abstract; figures 2-5; paragraphs [0023]-[0026].	1-22

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 MARCH 2012 (26.03.2012)	**27 MARCH 2012 (27.03.2012)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Kim Sun Jong Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/049000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004-0148434 A1	29.07.2004	CN 1517900 A	04.08.2004
		CN 1517900 C0	04.08.2004
		JP 2004-227562 A	12.08.2004
		JP 4545419 B2	09.07.2010
		JP 4545419 B2	15.09.2010
		US 7769881 B2	03.08.2010
US 2009-0182815 A1	16.07.2009	WO 2009-076251 A2	18.06.2009
		WO 2009-076251 A3	18.06.2009
US 2007-0165629 A1	19.07.2007	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007

Form PCT/ISA/210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/049000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007
US 2008-0273541 A1	06.11.2008	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**27 MARCH 2012 (27.03.2012)**
Applicant's or agent's file reference DAMA-30,900	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/049000	**24 AUGUST 2011 (24.08.2011)**	25 AUGUST 2010 (25.08.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [X] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 MARCH 2012 (26.03.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
   - ☐ paid additional fees
   - ☐ paid additional fees under protest and, where applicable, the protest fee
   - ☐ paid additional fees under protest but the applicable protest fee was not paid
   - ☐ not paid additional fees
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
   - ☐ complied with
   - ☒ not complied with for the following reasons:

I. Claims 1-17 are directed to a method for receiving, by a first endpoint, a communication peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

II. Claims 18-22 are directed to a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

Since the above mentioned groups of claims do not share any of the technical features identified, a technically special relationship between the inventions does not exist.

Accordingly, the claims do not relate to one invention or to a single inventive concept, a priori.

4. Consequently, this opinion has been established in respect of the following parts of the international application :
   - ☒ all parts.
   - ☐ the parts relating to claims Nos. _____

Form PCT/ISA/237 (Box No. IV) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-22	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-22	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2004-0148434 A1 (D. MATSUBARA et al.) 29 July 2004
D2: US 2009-0182815 A1 (J. CZECHOWSKI, III et al.) 16 July 2009
D3: US 2007-0165629 A1 (S. R. CHATURVEDI et al.) 19 July 2007
D4: US 2008-0273541 A1 (A. PHARN) 06 November 2008

1. Novelty and Inventive Step

1.1 Regarding independent claim 1, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for receiving, by a first endpoint, a *communication peer-to-peer communication session* between a second endpoint and a third end point in a hybrid peer-to-peer network comprising (fig. 5):
- sending, by the first endpoint, a first request to an access sever in the hybrid peer-to-peer network, wherein the first request includes information that enables the access server to identify a session entry corresponding to the ongoing communication session from a plurality of session entries corresponding to a plurality of communication sessions. (lines 1-6 in para. [0055]);
- receiving, by the first endpoint, a response to the first request from the access server, wherein the response includes a network address for a media server (lines 9-10 in para. [0057]);
- sending, by the first endpoint, a second request to the media server, wherein the second request includes information that enables the media server to identify a recording session corresponding to the ongoing communication session from a plurality of recording sessions corresponding to a plurality of communication sessions, wherein each recording session includes communications sent to the media server for recording by at least one endpoint in each of the plurality of communications sessions; and
- receiving, by the first endpoint via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints, wherein the first endpoint does not communicate with either of the second and third endpoints to receiver the peer-to-peer communications.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'sending, by the first endpoint, a second request to the media server and receiving, via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 835 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box No. V

1.2 Regarding independent claim 18, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network comprising (fig. 4):
- identifying, by the first endpoint, the ongoing communication session from a plurality of communication sessions (lines 1-6 in para. [0049]);
- obtaining from a server, by the first endpoint, first communications occurring between the second and third endpoints that correspond to the ongoing communication session, wherein the server is configured to receive the first communications from the first and second endpoints for recording (lines 1-12 in para. [0050]);
- establishing, by the first endpoint, a communication leg directly with the second endpoint, wherein the communication leg is capable of carrying second communications from the first endpoint to the second endpoint; and
- sending, by the first endpoint, the second communications to the second endpoint.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'establishing, by the first endpoint, a communication leg directly with the second endpoint and sending the second communications to the second endpoint'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 18 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.3 Claim 2-17 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.4 Claim 19-22 are dependent on claim 18 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-22 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,937		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/051877	**15 SEPTEMBER 2011 (15.09.2011)**	24 SEPTEMBER 2010 (24.09.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 8
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/051877

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/18(2006.01)i, G06F 15/16(2006.01)i, G06F 17/28(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 12/18; G06F 17/21; G06F 17/28; G10L 21/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:convert,language,translation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0006076 A1 (JINDAL DINESH K.) 01 January 2009 See abstract; paragraphs [0017],[0023],[0030]; claims 1,2	1-20
A	US 06161082A A (GOLDBERG; RANDY G. et al.) 12 December 2000 See abstract; column 3 lines 1-6,20-25, column 5 lines 25-34; claims1,5	1-20
A	US 2010-0223047 A1 (CHRIST OLIVER) 02 September 2010 See paragraphs [0057],[0095]; claims 1,11,18,19	1-20
A	US 2010-0299150 A1 (FEIN GENE S. et al.) 25 November 2010 See abstract; paragraphs [0034],[0036]-[0039],[0071]; claims 1,11	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 APRIL 2012 (13.04.2012)	**13 APRIL 2012 (13.04.2012)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

YANG, CHAN HO

Telephone No. 82-42-481-5689

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/051877

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0006076 A1	01.01.2009	None	
US 06161082A A	12.12.2000	None	
US 2010-0223047 A1	02.09.2010	CN 101826072 A	08.09.2010
		EP 2226733 A1	08.09.2010
		GB 0903418 D0	08.04.2009
		GB 2468278 A	08.09.2010
		JP 2010-205268 A	16.09.2010
		US 2011-0184719 A1	28.07.2011
US 2010-0299150 A1	25.11.2010	None	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**13 APRIL 2012 (13.04.2012)**
Applicant's or agent's file reference: DAMA-30,937	**FOR FURTHER ACTION**: See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/051877	**15 SEPTEMBER 2011 (15.09.2011)**	24 SEPTEMBER 2010 (24.09.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/18(2006.01)i, G06F 15/16(2006.01)i, G06F 17/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	13 APRIL 2012 (13.04.2012)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0006076 A1 (JINDAL DINESH K.) 01 January 2009
D2: US 06161082A A (GOLDBERG; RANDY G. et al.) 12 December 2000
D3: US 2010-0223047 A1 (CHRIST OLIVER) 02 September 2010
D4: US 2010-0299150 A1 (FEIN GENE S. et al.) 25 November 2010

1. Novelty and Inventive Step

D1 and D2, which is considered to be close prior art to the subject matter of claim 1 of the present invention, discloses a method for communicating, by a first endpoint, in an ongoing peer-to-peer communication session between the first endpoint and a second endpoint in a hybrid peer-to-peer network comprising:
establishing, by the first endpoint, a communications route directly between the first endpoint and the second endpoint, wherein signaling communications are sent directly from the first endpoint to the second endpoint via a signaling path provided by the communications route (see column 3 lines 1-6, 20-25 in D2);
receiving, by the first endpoint, audio speech input in a first spoken language from a user of the first endpoint (see paragraph [0023]; claim 1 in D1);
determining, by the first endpoint, whether the audio speech input is to be translated from the first spoken language to a second spoken language (see column 5 lines 25-34 in D2); and
sending, by the first endpoint, the audio speech input to a language translation component accessible to the first endpoint via the hybrid peer-to-peer network if the audio speech input is to be translated from the first spoken language to the second spoken language, wherein the first endpoint does not send the audio speech input directly to the second endpoint if the audio speech input is to be translated from the spoken language to the second spoken language (see paragraph [0023]; claim 1 in D1).

However, the subject matter of claim 1 differs from these prior art documents in sending, by the first endpoint, the audio speech input directly to the second endpoint via the communications route if the audio speech input is not to be translated from the first spoken language to the second language. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 842 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box V

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 10 differs from these prior art documents in notifying, by the first endpoint, a language translation component in the hybrid peer-to-peer network of the inbound port, wherein the language translation component is accessible to the first endpoint via the hybrid peer-to-peer network, and wherein the notifying instructs the language translation component to send audio received from the endpoint to the inbound port. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 10 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 18 differs from these prior art documents in performing an authentication process with an access server in a hybrid peer-to-peer network, wherein the authentication process authorizes the first endpoint to access the hybrid peer-to-peer network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 19 and 20 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30.960		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/055101	**06 OCTOBER 2011 (06.10.2011)**	11 OCTOBER 2010 (11.10.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.*6bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/055101

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/58(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/06; H04B 7/00; G06F 15/16; H04L 12/66; H04W 4/00; H04L 12/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: call, forwarding, deliver*, switchover, redirect, rerout*, peer-to-peer, P2P, SIP, session initiation protocol, invitation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005-0130650 A1 (THOMAS CREAMER et al.) 16 June 2005 See claims 1-3 and 6; paragraphs [34]-[40]; figures 1 and 2	1-26
A	US 2009-0088150 A1 (CHATURVEDI SIVAKUMAR et al.) 02 April 2009 See claims 1-6; paragraphs [19]-[24],[34]-[36]; figures 1,2,4 and 5	1-26
A	US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005 See paragraphs [57]-[60],[89]-[92],[101]; figures 4 and 13	1-26
A	US 2010-0011111 A1 (VIZAEI MOHAMMAD) 14 January 2010 See claims 8,13 and 14; paragraphs [12],[28]-[36]; figure 1	1-26

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 MAY 2012 (21.05.2012)	**22 MAY 2012 (22.05.2012)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
Lee Hyoung Il
Telephone No. 82-42-481-8199

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/055101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0130650 A1	16.06.2005	CN 1630266 A	22.06.2005
		CN 1630266 C	14.05.2008
		JP 04-160951 B2	08.10.2008
		JP 2005-184820 A	07.07.2005
		US 7215959 B2	08.05.2007
US 2009-0088150 A1	02.04.2009	WO 2009-043016 A2	02.04.2009
		WO 2009-043016 A3	14.05.2009
US 2005-0286519 A1	29.12.2005	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		JP 4681697 B2	11.05.2011
		MX 2007000141 A	15.04.2009
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
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		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		US 8139578 B2	20.03.2012
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134261 A2	22.11.2007

Ex.1079 / IPR2026-00210 / Page 846 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/055101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-134263 A2	22.11.2007
US 2010-0011111 A1	14.01.2010	CN 101536481 A	16.09.2009
		EP 2057832 A1	13.05.2009
		KR 10-2009-0053924 A	28.05.2009
		WO 2008-022855 A1	28.02.2008

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F.BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**22 MAY 2012 (22.05.2012)**
Applicant's or agent's file reference: DAMA-30.960	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/055101	**06 OCTOBER 2011 (06.10.2011)**	11 OCTOBER 2010 (11.10.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/58(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [X] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	21 MAY 2012 (21.05.2012)	Lee Hyoung Il Telephone No.82-42-481-8199

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-26	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-26	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0130650 A1 (THOMAS CREAMER et al.) 16 June 2005
D2: US 2009-0088150 A1 (CHATURVEDI SIVAKUMAR et al.) 02 April 2009
D3: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D4: US 2010-0011111 A1 (VIZAEI MOHAMMAD) 14 January 2010

1. Novelty and Inventive Step

1.1 Claims 1-13

The subject matter of claim 1 differs from these prior art documents in receiving an inbound call, wherein the inbound call is received via one of a cellular network and a public switched telephone network and continuing the inbound call on the one of the cellular network and the public switched telephone network on which the inbound call was received if the acknowledgement message has not been received. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-13 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

1.2 Claims 14-20

The subject matter of claim 14 differs from these prior art documents in receiving a first plurality of digits identifying a first destination device and initiating an outbound call to the first destination device based on the first plurality of digits, wherein the outbound call is initiated vis one of a cellular network and a public switched telephone network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 14 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 15-20 are dependent on claim 14 and therefore meet the requirements of PCT Article 33(2) and (3).

[Continued on Supplemental Box]

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Figures 2a-2c, 10A-10B and 11A-11B do not comply with PCT Rule 11.13(k) because the different figures shall not be numbered in Arabic numerals consecutively and independently of the numbering of the sheets.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

[Box V]

1.2 Claims 21-26

Claim 21 relates to an endpoint to perform the method according to claim 14. Claim 21 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3), because the subject matter of claim 14 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

Claims 22-26 depend on claim 21 and consequently they are also considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-26 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 30 August 2012 (30.08.2012)	
Applicant's or agent's file reference DAMA-30,559	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024870	15 February 2011 (15.02.2011)	15 February 2010 (15.02.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Simin Baharlou

e-mail: pt09.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,559	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/024870	International filing date *(day/month/year)* 15 February 2011 (15.02.2011)	Priority date *(day/month/year)* 15 February 2010 (15.02.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 21 August 2012 (21.08.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Simin Baharlou e-mail: pt09.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**26 OCTOBER 2011 (26.10.2011)**
Applicant's or agent's file reference DAMA-30,559	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024870	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/28(2006.01)i, G06F 15/173(2006.01)i, H04L 29/06(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 OCTOBER 2011 (26.10.2011)	KWON, Ho Young Telephone No.82-42-481-8478

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: J. ROSENBERG et al. "Session Traversal Utilities for NAT (STUN)", draft-ietf-behave-rfc3489bis-06, March 5, 2007
D2: US 7623516 B2 (CHATURVEDI, SIVAKUMAR R. et al.) 24 November 2009
D3: US 7623476 B2 (RAVIKUMAR, SIVAKUMAR et al.) 24 November 2009
D4: US 7590758 B2 (TAKEDA, YUTAKA et al.) 15 September 2009
D5: US 2006-0182100 A1 (LI, JIN et al.) 17 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1 Claims 1-5

D1 is regarded as the closest prior art to the subject matter of claim 1. The subject matter of claim 1 differs from that of D1 in that the method in claim 1 comprises "receiving, by the first endpoint, a first private presence message, a first public presence message, and a first relay presence message from the second endpoint via private, public, and relay routes, respectively, wherein the private route corresponds to a local address assigned to the first endpoint by a network address translation (NAT) device in a local network, the public route corresponds to a public address of the NAT device, and the relay route uses a reflector", "sending to the second endpoint by the first endpoint", "sending a second private presence message", "receiving a second response from the second endpoint to one of the second private, public, or relay message by the first endpoint", "selecting the private, public, or relay route by the first endpoint", and "identifying the private, public, or relay route". These features of claim 1 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 1 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 1 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 1 is considered to involve an inventive step under PCT Article 33(3).

Claims 2-5 are dependent on claim 1 and as such also meet the requirements of PCT Article 33(2) and 33(3).

1.2 Claims 6-18

D1 is regarded as the closest prior art to the subject matter of claim 6. The subject matter of claim 6 differs from that of D1 in that the method in claim 6 comprises "sending, by the first endpoint, a first presence message to the second endpoint via a first route", "sending, by the first endpoint, a second presence message to the second endpoint via a second route", and "receiving a response from the second endpoint to one of the first and second presence messages, wherein the response identifies which of the first and second presence messages is being answered by the response". These features of claim 6 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 6 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 6 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 6 is considered to involve an inventive step under PCT Article 33(3).

Claims 7-18 are dependent on claim 6 and as such also meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 857 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

According to the requirements of PCT Rule 11.13(k), the different figures shall be numbered in Arabic numerals consecutively and independently of the numbering of the sheet. This requirement is not met in view of the use of FIG. 2a, FIG. 2b, FIG. 2c, FIG. 2d, FIG. 2e, FIG. 2f, FIG. 2g, FIG. 3a, FIG. 3b, FIG. 19A, FIG. 19B, FIG. 23A, FIG. 23B.

Ex.1079 / IPR2026-00210 / Page 858 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.3 Claims 19-20

D1 is regarded as the closest prior art to the subject matter of claim 19. The subject matter of claim 19 differs from that of D1 in that the endpoint in claim 19 comprises "sending first and second presence messages via first and second routes", "receiving a first response from the other endpoint to one of the first and second presence messages", "selecting the first or second route that corresponds to the first or second presence message, respectively", "receiving a third presence message via one of the first and second routes", "sending a second response to the third presence message to the other endpoint via the first or second route". These features of claim 19 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 19 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 19 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 19 is considered to involve an inventive step under PCT Article 33(3).

Claims 20 is dependent on claim 19 and as such also meets the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

The subject matter of claims 1-20 has industrial applicability and meets the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 30 August 2012 (30.08.2012)	
Applicant's or agent's file reference DAMA-30,562	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024891	15 February 2011 (15.02.2011)	15 February 2010 (15.02.2010)

Applicant
DAMAKA,INC et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Philippe Bécamel

e-mail: pt01.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,562	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/024891	International filing date *(day/month/year)* 15 February 2011 (15.02.2011)	Priority date *(day/month/year)* 15 February 2010 (15.02.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA,INC		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 21 August 2012 (21.08.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Bécamel e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**25 NOVEMBER 2011 (25.11.2011)**
Applicant's or agent's file reference DAMA-30,562	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024891	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA,INC et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2007-0019545 A1 (WADE R. ALT et al.) 25 January 2007
D2: US 2005-0208947 A1 (PRADEEP BAHL) 22 September 2005
D3: US 2007-0297430 A1 (PETRI NYKANEN et al.) 27 December 2007
D4: US 2003-0214955 A1 (JUN-HYEONG KIM) 20 November 2003
D5: US 2005-0270992 A1 (AJIT SANZGIRI et al.) 08 December 2005

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

D1 discloses a method for providing packetized communication services, the method comprising: receiving a request from a first endpoint of a first domain for establishing a communication session with a second endpoint of a second domain; and establishing a tunnel by a network address translation server to support the communication session, the network address translation server being controlled by a service provider as part of a managed communication service, the tunnel traversing a first firewall and a first network address translator of the first domain and a second firewall and a second network address translator of the second domain to reach the second endpoint; and encrypting the communication session for transport via the tunnel.

D2 discloses a method and mobile node that facilitate persisting virtual private network structures across multiple network addresses assigned to the mobile node. The method includes initially setting up a virtual private network tunnel between a mobile node and a virtual private network tunnel server.

D3 discloses a communication network for providing seamless peer-to-peer connectivity between nodes of different communication network environments, the communication network comprising at least one tunneling server comprising an access unit for providing access to the communication network and an addressing unit for assigning a dynamic address of a first addressing scheme routable in the communication network to a node connecting itself to the tunneling server, the node having a fixed address of a second addressing scheme, and storing at runtime an association between the fixed address of the second addressing scheme and the dynamic address of the first addressing scheme.

D4 discloses a network connection apparatus for communicating between a network device located in a first private network and a second private network located outside the first private network. The apparatus includes an address acquisition module capable of acquiring a public IP address of a network management device from a DNS based on a domain name of the network management device of the second private network.

D5 discloses a method for transferring information in a digital network, wherein the network includes a router, an access point, a user device, and a plurality of other devices all coupled to the network, the method comprising creating a multipoint tunnel communication mode to transfer information from the user device to at least one of the other devices; using a routing configuration to route communications over the multipoint tunnel; and modifying the routing configuration in response to a discovered host.

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 864 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.1 In regard to claim 1, none of the documents D1 to D5 nor any combination thereof teaches or fairly suggests the features wherein "determining identifies that none of a private interface, a public interface, and a relay interface are available when using the first message protocol" and wherein "the private interface corresponds to a local address assigned to the first endpoint by a NAT device in a local network, the public interface corresponds to a public address of the NAT device that represents the first endpoint in networks outside of the local network, and the relay interface corresponds to a reflector located outside of the local network". Accordingly, it would not have been obvious to a person skilled in the art to apply the knowledge of D1 to D5 in order to create the method for establishing a peer-to-peer communication session between first and second endpoints according to claim 1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3).

1.2 The features of claim 9 essentially correspond to those of claim 1 in that the former are described from the viewpoint of a tunneling server and the latter from that of a first endpoint. Therefore, claim 9 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.3 The features of claim 15 essentially correspond to those of claim 1 except that their invention categories are different. Therefore, claim 15 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.4 Claims 2-8, 10-14, and 16-20 are dependent on claims 1, 9, and 15, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O.Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 04 October 2012 (04.10.2012)	
Applicant's or agent's file reference DAMA-30,563	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/028685	16 March 2011 (16.03.2011)	19 March 2010 (19.03.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Nora Lindner

e-mail: pt03.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,563	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/028685	International filing date *(day/month/year)* 16 March 2011 (16.03.2011)	Priority date *(day/month/year)* 19 March 2010 (19.03.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 25 September 2012 (25.09.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Nora Lindner e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**09 NOVEMBER 2011 (09.11.2011)**
Applicant's or agent's file reference DAMA-30,563	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/028685	**16 MARCH 2011 (16.03.2011)**	19 MARCH 2010 (19.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/32(2006.01)i, H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	08 NOVEMBER 2011 (08.11.2011)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2008-0080392 A1 (WALSH, RICHARD J et al.) 03 April 2008
D2: US 2006-0218624 A1 (RAVIKUMAR, SIVAKUMAR et al.) 28 September 2006
D3: US 2009-0300673 A1 (BACHET, FRANCK et al.) 03 December 2009

1. Novelty and Inventive Step

The subject matter of claims 1, 12 and 18 differs from the documents D1-D3 in that a mapped endpoint lacks the functionality needed to communicate directly with a peer-to-peer network (or the mapped endpoint is incompatible with the peer-to-peer network). Accordingly, claims 1, 12 and 18 are not anticipated by any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.

Thus, **claims 1, 12 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 2-11, 13-17 and 19-20 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 1, 12 and 18, respectively.**

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

Ex.1079 / IPR2026-00210 / Page 870 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/028685

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 11, dependent on claim 1, is worded in reference to a method step of claim 1, "sending a message by the virtual endpoint to the mapped endpoint". However, said method step has not been worded in claim 1. Therefore, claim 11 does not meet the requirements of PCT Article 6.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O.Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 26 October 2012 (26.10.2012)	
Applicant's or agent's file reference DAMA-30,572	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031245	05 April 2011 (05.04.2011)	16 April 2010 (16.04.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Athina Nickitas-Etienne

e-mail: pt04.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,572	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/031245	International filing date *(day/month/year)* 05 April 2011 (05.04.2011)	Priority date *(day/month/year)* 16 April 2010 (16.04.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 16 October 2012 (16.10.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**26 DECEMBER 2011 (26.12.2011)**
Applicant's or agent's file reference DAMA-30,572	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031245	**05 APRIL 2011 (05.04.2011)**	16 APRIL 2010 (16.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/66(2006.01)i, H04L 12/46(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 DECEMBER 2011 (26.12.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 7

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international search *(specify)*:

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 7 are so unclear that no meaningful opinion could be formed *(specify)*:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for said claims Nos. 7

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

☐ See Supplemental Box for further details.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-6,8-21	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: EP 1988698 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008
D2: US 2009-0052399 A1 (A. SILVER et al.) 26 February 2009
D3: US 2007-0206563 A1 (A. SILVER et al.) 06 September 2007
D4: EP 1988697 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008

1. Novelty and Inventive step

1.1 Claim 1 relates to an enterprise network comprising:
- an enterprise private branch exchange (PBX) having a pilot number associated therewith, wherein the enterprise PBX is configured to communicate signaling information with a client of the enterprise network when the client is positioned in a cellular network that is separate from the enterprise network and is outside of the enterprise network's control, and wherein the enterprise PBX is further configured to communicate signaling information with an external device coupled to a PSTN that is external to the enterprise network;
- an enterprise IP-Public Switched Telephone Network (PSTN) media gateway configured to provide a first media path between the client and the enterprise IP-PSTN media gateway when the client is positioned in the cellular network, and further configured to provide a second media path between the enterprise IP-PSTN media gateway and the external device;
- a voice call continuity (VCC) Session Initiation Protocol (SIP) server configured to communicate with the enterprise PBX in order to perform signaling functions for the client via the enterprise PBX when the client is positioned in the cellular network, and further configured to communicate signaling information directly with the client when the client is positioned in an IP network that is separate from the enterprise network and is outside of the enterprise network's control; and
- a VCC media gateway configured to communicate with the enterprise IP-PSTN media gateway and the VCC SIP server and to receive digits corresponding to a destination number associated with the external device from the client after the client places a call to the pilot number, further configured to anchor the first and second media paths, and further configured to provide a third media path directly to the client when the client is positioned in the IP network and to anchor the third media path.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said enterprise network of claim 1, and the features of claim 1 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.2 Claims 2-5 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

Ex.1079 / IPR2026-00210 / Page 877 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/031245

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.3 Claim 6 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call request at a pilot number of the enterprise network from a first device that is a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, and wherein the first device is located in a first communication network that is external to the enterprise network and not controlled by the enterprise network;
- receiving, by the enterprise network, a plurality of digits from the first device, wherein the plurality of digits provide contact information corresponding to a second device that is located in a second communication network that is external to the enterprise network and not controlled by the enterprise network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, and wherein the first and second media paths connect the first and second devices for the communication session.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 6, and the features of claim 6 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 6 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.4 Claims 8-15 are dependent on claim 6 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claim 16 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call at a pilot number of the enterprise network from a second device that is not a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, wherein the call identifies a first device that is a client of the enterprise network as a destination, and wherein the first and second devices are both located in communication networks that are external to the enterprise network and are not controlled by the enterprise network;
- identifying, by the enterprise network, whether the first device is registered with the enterprise network as available to the enterprise network via an Internet Protocol (IP) network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network, and wherein the first media path is a cellular bearer path if the first device is not registered as available via the IP network and is an IP bearer path if the first device is registered as available via the IP network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, wherein the first and second media paths connect the first and second devices for the communication session.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 16, and the features of claim 16 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 16 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.6 Claims 17-21 are dependent on claim 16 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-6 and 8-21 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, LLP
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 11 October 2012 (11.10.2012)	
Applicant's or agent's file reference DAMA-30,568	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/029954	25 March 2011 (25.03.2011)	29 March 2010 (29.03.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Yukari Nakamura

e-mail: pt07.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,568	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/029954	International filing date *(day/month/year)* 25 March 2011 (25.03.2011)	Priority date *(day/month/year)* 29 March 2010 (29.03.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 02 October 2012 (02.10.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Yukari Nakamura e-mail: pt07.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**24 NOVEMBER 2011 (24.11.2011)**
Applicant's or agent's file reference DAMA-30,568	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/029954	**25 MARCH 2011 (25.03.2011)**	29 MARCH 2010 (29.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i, H04L 9/32(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0003322 A1 (ISUMI, SHINYA) 01 January 2009
D2: US 2009-0327516 A1 (AMISHIMA, MAKI et al.) 31 December 2009
D3: EP 1848163 A1 (SHARP KABUSHIKI KAISHA) 24 October 2007
D4: US 2006-0187926 A1 (IMAI, NAOKI) 24 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1. In regard to claim 10, document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

A method for sweeping an active session exiting between a first endpoint and a second endpoint from the first endpoint to a third endpoint (see 'change the first communication to the second communication' in claim 1), the method comprising:
receiving, by the first end point, a go away message directly from the third end point (see 'receiving a call instruction' in claim 2); and
transferring, by the first endpoint, session information to the third endpoint, wherein the session information includes information needed by the third endpoint to enter the active session with the second endpoint (see 'employing the coding scheme stormed in the memory to perform ... call setting between the second and third IP phones' in claim 2).

However, D1 does not explicitly disclose the features of checking, by the first endpoint, a policy associated with the first endpoint to determine an action to be taken upon receipt of the go away message; and identifying, by the first endpoint, that the first endpoint is engaged in an active session with the second endpoint. In addition, these features of claim 10 are not disclosed in any other documents cited in the ISR, nor would they be obvious to a person skilled in the art. Therefore, claim 10 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2. Claims 1 and 18 include the essential features of claim 10, and the features of claims 1 and 18 essentially correspond to those defined in claim 10. Therefore, claims 1 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.3. Claims 2-9, 11-17, and 19-20 are dependent on claims 1, 10, and 18, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

Ex.1079 / IPR2026-00210 / Page 885 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O.Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 08 November 2012 (08.11.2012)	
Applicant's or agent's file reference DAMA-30,746	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031246	05 April 2011 (05.04.2011)	29 April 2010 (29.04.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Athina Nickitas-Etienne

e-mail: pt04.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,746	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/031246	International filing date *(day/month/year)* 05 April 2011 (05.04.2011)	Priority date *(day/month/year)* 29 April 2010 (29.04.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 30 October 2012 (30.10.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)* **28 DECEMBER 2011 (28.12.2011)**

Applicant's or agent's file reference
DAMA-30,746

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031246	**05 APRIL 2011 (05.04.2011)**	29 APRIL 2010 (29.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	27 DECEMBER 2011 (27.12.2011)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-24	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D2: US 2006-0203750 A1 (SIVAKUMAR RAVIKUMAR et al.) 14 September 2006
D3: US 2006-0120375 A1 (SIVAKUMAR RAVIKUMAR et al.) 08 June 2006
D4: US 2007-0165629 A1 (SIVAKUMAR CHATURVEDI et al.) 19 July 2007

(1) Novelty (N) and Inventive Step (IS)

The subject matter of claim 1, 10, and 18 differs from these prior art documents in establishing, by the first endpoint, at least one media route with the second endpoint to carry media for the call, wherein the at least one media route is established using the peer-to-peer hybrid network and not the third party instant message system. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1, 10, and 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 19-24 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

(2) Industrial Applicability (IA)

Claims 1-24 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To:
Timothy F.Bliss
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, Texas 75374-1715
United States of America

Date of mailing *(day/month/year)* 18 October 2012 (18.10.2012)	
Applicant's or agent's file reference DAMA-31343	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 2012/046026	International filing date *(day/month/year)* 10 July 2012 (10.07.2012)
Applicant DAMAKA, INC. et al.	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:

   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the ISA/ FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1 Facsimile No. +7 (499) 243-33-37	Authorized officer L. Tsoban Telephone No. 495-531-64-81

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DAMA-31343	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 2012/046026	International filing date *(day/month/year)* 10 July 2012 (10.07.2012)	(Earliest) Priority Date *(day/month/year)* 15 July 2011 (15.07.2011)
Applicant DAMAKA, INC. et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

[ ] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed.

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (see Box No. II).

3. [ ] **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the drawings to be published with the abstract is Figure No. _____

[ ] as suggested by the applicant.

[ ] as selected by this Authority, because the applicant failed to suggest a figure.

[ ] as selected by this Authority, because this figure better characterizes the invention.

b. [X] none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 2012/046026

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/56 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 12/56, 12/24, 12/26, H04W 24/00, 28/00, 28/02, H04L 1/00, 1/16, 29/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WIPO, Esp@cenet, USPTO, PatSearch

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2006/064047 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION et al.) 22.06.2006	1-16
A	EP 1638275 A2 (WECOMM LIMITED) 22.03.2006	1-16
A	EP 1603339 A1 (STMICROELECTRONICS S.R.L.) 07.12.2005	1-16

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 September 2012 (24.09.2012)	18 October 2012 (18.10.2012)
Name and mailing address of the ISA/ FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1 Facsimile No. +7 (499) 243-33-37	Authorized officer K. Raskovalov Telephone No. (495)531-64-81

Form PCT/ISA/210 (second sheet) (July 2009)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

To:
Timothy F.Bliss
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, Texas 75374-1715
United States of America

Date of mailing *(day/month/year)* 18 October 2012 (18.10.2012)	
Applicant's or agent's file reference DAMA-31343	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 2012/046026	10 July 2012 (10.07.2012)	15 July 2011 (15.07.2011)

International Patent Classification (IPC) or both national classification and IPC
H04L 12/56 (2006.01)

Applicant
DAMAKA, INC. et al.

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/ FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1 Facsimile No. +7 (499) 243-33-37	Date of completion of this opinion 24 September 2012 (24.09.2012)	Authorized officer K. Raskovalov Telephone No. (495)531-64-81

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 2012/046026

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [X] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      - [ ] on paper
      - [ ] in electronic form

   b. (time)

      - [ ] in the international application as filed
      - [ ] together with the international application in electronic form
      - [ ] subsequently to this Authority for the purposes of search

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 2012/046026

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-16	YES
	Claims		NO
Inventive step (IS)	Claims	1-16	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-16	YES
	Claims		NO

2. Citations and explanations:

D1: WO 2006064047 A1, D2: EP 1638275 A2 D3: EP 1603339 A1.

D1 discloses a method for streaming data using a virtual bi-directional data stream between a first communication device and a second communication device (page 1, lines 37-39), including the following stages:

creating, by the first device, a streaming data packet (DP) (D1, fig. 10);

inserting, by the first device, the data segment and DP into a payload section of a connection-less transport layer packet (D1, fig. 10), wherein at least one of DP and the transport layer packet includes a send field identifying a starting location in the data stream of a data segment to be sent with DP (D1, page 4, lines 2-4), an acknowledgement (ACK) field identifying a location in the data stream up to which all data has been received by the first device (D1, page 2, lines 6-9), a unique identifier (UID) identifying a connection used by the first device for the data stream (D1, page 3, lines 37-38), a packet type field (D1, page 2, lines 34-39), a pad field identifying an amount of padding used to ensure DP has a predefined length (D1, page 3, lines 15-16), a network address of the first device, a network address of the second device (D1, page 3, lines 12-15), and a length of the transport layer packet (D1, page 4, lines 4-5);

sending, by the first device, the transport layer packet to the second device (D1, fig. 4);

obtaining, by the first device, a current round trip time (RTT) that is based on first and second RTTs of packets previously sent from the first device to the second device and a configurable RTT variation factor (D1, page 13, paragraph 1);

calculating, by the first device, a timeout for DP based on the current RTT (D1, page 13, paragraph 1) and

resending, by the first device, D1 if the timeout does not exceed a predefined timeout limit and if an ACK for D1 has not been received from the second device (D1, fig. 7; page 2, paragraph 2).

The invention of claim 1 differs from the invention of D1 in that DP contains "a window field identifying an amount of space available in a receive buffer of the first device", which is obvious for a person skilled in the art, as well as in that the first device receives the current round trip time variance, which is based on the previous RTT variance, the first and second RTTs, and a configurable RTT variance variation factor, and the first device is calculating a timeout for DP based, among other values, on the current RTT variance, which does not obviously follow from the state of the art, and contributes to defining the timeout time more precisely, and, as a result, increasing the connection reliability.

Therefore, the invention of independent claim 1 and dependent claims 2-16 meets the criteria of novelty and inventive step.

The invention of claims 1-16 meets the criterion of industrial applicability.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)*	
03 January 2013 (03.01.2013)	
Applicant's or agent's file reference	IMPORTANT NOTICE
DAMA-30,814	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/040864	17 June 2011 (17.06.2011)	18 June 2010 (18.06.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Simin Baharlou

e-mail: pt09.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,814	**FOR FURTHER ACTION**	See Item 4 below
International application No. PCT/US2011/040864	International filing date *(day/month/year)* 17 June 2011 (17.06.2011)	Priority date *(day/month/year)* 18 June 2010 (18.06.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis*.2).

	Date of issuance of this report 19 December 2012 (19.12.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Simin Baharlou
Facsimile No. +41 22 338 82 70	e-mail: pt09.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

	Date of mailing *(day/month/year)* **17 FEBRUARY 2012 (17.02.2012)**
Applicant's or agent's file reference DAMA-30,814	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/040864	**17 JUNE 2011 (17.06.2011)**	18 JUNE 2010 (18.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	10 FEBRUARY 2012 (10.02.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations:

Reference is made to the following documents:

D1: US 2008-0259408 A1 (C. Y. TSUI et al.) 09 October 2008
D2: US 2009-0136016 A1 (M. GORNOI et al.) 28 May 2009
D3: US 2006-0206750 A1 (S. RAVIKUMAR et al.) 14 September 2006
D4: US 2008-0235302 A1 (S. KJESBU et al.) 25 September 2008

1. Novelty and inventive step

Regarding independent claim 1, document D1 which is considered to represent the most relevant state of the art discloses (the references in parentheses applying to this document):

a method for transferring a call in a hybrid peer-to-peer network comprising:
- receiving, by a first endpoint, an instruction to transfer a call to a second endpoint, wherein the first endpoint is engaged in the call with a third endpoint when the instruction is received (lines 10-17 in paragraph [51]);
- determining, by the first endpoint, whether the first endpoint has a buddy relationship with the second endpoint, wherein the first endpoint cannot transfer the call to the second endpoint unless the first and second endpoints have a buddy relationship because the buddy relationship is needed to provide permission by the second endpoint for the first endpoint to communicate with the second endpoint (paragraph [32]);
- sending, by the first endpoint, at least one transfer message to the second endpoint to transfer the call, wherein the at least one transfer message indicates that the first endpoint wants to transfer the call to the second endpoint and identifies the third endpoint as being involved in the call (paragraphs [32],[50]); and
- ending, by the first endpoint, the first endpoint's involvement in the call after the call is transferred (paragraphs [32],[50]).

The subject matter of claim 1 differs from that of D1 in that D1 does not disclose the features ofestablishing, by the first endpoint, a buddy relationship with the second endpoint if the first and second endpoints are not in a buddy relationship. In addition, this difference would not be obvious to a person skilled in the art over D1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2 The features of independent claim 10 essentially correspond to those of claim 1 in that the former are described from a second endpoint receiving a call transfer and the latter from that of a first endpoint performing a call transfer. Therefore, claim 10 meets the requirements of PCT Article
Continued on Supplemental Box

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box V

33(2) and 33(2) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.3 The features of independent claim 18 essentially correspond to those of claim 1 except that claimed categories are different to each other. Therefore, claim 18 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.4 Claims 2-9 are dependent on claim 1, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claims 11-17 are dependent on claim 10, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.6 Claims 19 and 20 are dependent on claim 18, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 10 January 2013 (10.01.2013)	
Applicant's or agent's file reference DAMA-30,815	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/041565	23 June 2011 (23.06.2011)	23 June 2010 (23.06.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Simin Baharlou

e-mail: pt09.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,815	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/041565	International filing date *(day/month/year)* 23 June 2011 (23.06.2011)	Priority date *(day/month/year)* 23 June 2010 (23.06.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 28 December 2012 (28.12.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Simin Baharlou e-mail: pt09.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**05 JANUARY 2012 (05.01.2012)**
Applicant's or agent's file reference DAMA-30.815	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/041565	**23 JUNE 2011 (23.06.2011)**	23 JUNE 2010 (23.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/14(2006.01)i, H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, G06F 21/20(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	05 JANUARY 2012 (05.01.2012)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	2-4,11,13-19	YES
	Claims	1,5-10,12	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000.
D2: US 2008-0235511 A1 (O`BRIEN WILLIAM G. et al.) 25 September 2008
D3: US 2010-0049980 A1 (BARRIGA LUIS et al.) 25 February 2010

1. Novelty and Inventive Step

1.1 Claims 1-12

D1, which is considered to represent the most relevant state of the art to the subject matter of independent claim 1, discloses a method for changing an encryption key, the method comprising: receiving, by a first endpoint, an instruction to change from a first encryption key to a second encryption key; sending, by the first endpoint, a first message to a second endpoint that the first endpoint is going to change to the second encryption key, wherein the first message includes information representing the second encryption key; receiving, by the first endpoint, in response to the first message, a second message from the second endpoint indicating that the second endpoint received the first message; sending, by the first endpoint, a third message to the second endpoint acknowledging receipt of the second message; and changing, by the first endpoint, from the first encryption key to the second encryption key, wherein all incoming messages for the first endpoint are to be encrypted using the second encryption key (the technical features related to "Key refresh" and 'Finished' in the whole document of D1).

D1 does not disclose the feature, "the messages are defined for use with a transactional state model in a peer-to-peer network". However, it would be readily derived from the features in figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art. Accordingly, claim 1 is obvious over D1 in view of D2. Therefore, **claim 1 lacks an inventive step under PCT Article 33(3)**.

The additional feature of claim 5, dependent on claim 1, would be readily derived from figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

The additional features of claims 6-7 and 10, dependent on claim 1, would be readily derived from the features related to "Key refresh" and 'Finished' of D1 and figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

<**Continued on Supplemental Box**>

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

<**Box No.V**>

The additional features of claims 8-9, dependent on claim 7, are not explicitly disclosed in any of the documents D1-D3. However, they would be regarded as normal design options by a person skilled in the art.
The additional feature of claim 12, dependent on claim 1, are not explicitly disclosed in any of the documents D1-D3. However, it would be regarded as a normal design option by a person skilled in the art.
Therefore, **claims 5-10 and 12 lack an inventive step under PCT Article 33(3).**

The additional features of claims 2-4 and 11, dependent on claim 1, are not disclosed in any of the documents D1-D3, nor are they obvious to a person skilled in the art over the documents individually or in combination. Accordingly, **claims 2-4 and 11 are novel and involve an inventive step under PCT Article 33(2) and (3).**

1.2 Claims 13-19
The subject matter of claims 13 and 17 differs from the documents D1-D3 in the following features: receiving, by a first endpoint, an encrypted message from a second endpoint; applying a first key iteration of a second base encryption key to the encrypted message to determine if the first key iteration will decrypt the encrypted message; if the first key iteration will not decrypt the message, rotating the encryption key to form a next key iteration from the second based encryption key; and applying the next key iteration to the encrypted message to determine if the next key iteration will decrypt the encrypted message as long as untried key iterations are available, continuing the steps of rotating and applying for each key iteration until the message is decrypted.
Accordingly, claims 13 and 17 are not anticipated from any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.
Thus, **claims 13 and 17 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 14-16 and 18-19 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 13 and 17, respectively.**

2. Industrial Applicability
Claims 1-19 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,900	**FOR FURTHER ACTION**	See Item 4 below
International application No. PCT/US2011/049000	International filing date *(day/month/year)* 24 August 2011 (24.08.2011)	Priority date *(day/month/year)* 25 August 2010 (25.08.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis*.2).

	Date of issuance of this report 26 February 2013 (26.02.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Bécamel e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**27 MARCH 2012 (27.03.2012)**
Applicant's or agent's file reference: DAMA-30,900	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/049000	**24 AUGUST 2011 (24.08.2011)**	25 AUGUST 2010 (25.08.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2 **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 MARCH 2012 (26.03.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
   - ☐ paid additional fees
   - ☐ paid additional fees under protest and, where applicable, the protest fee
   - ☐ paid additional fees under protest but the applicable protest fee was not paid
   - ☐ not paid additional fees
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is:
   - ☐ complied with
   - ☒ not complied with for the following reasons:

I. Claims 1-17 are directed to a method for receiving, by a first endpoint, a communication peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

II. Claims 18-22 are directed to a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

Since the above mentioned groups of claims do not share any of the technical features identified, a technically special relationship between the inventions does not exist.

Accordingly, the claims do not relate to one invention or to a single inventive concept, a priori.

4. Consequently, this opinion has been established in respect of the following parts of the international application:
   - ☒ all parts.
   - ☐ the parts relating to claims Nos. _____

Form PCT/ISA/237 (Box No. IV) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-22	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-22	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims	NONE	NO

2. Citations and explanations:

Reference is made to the following documents:

D1: US 2004-0148434 A1 (D. MATSUBARA et al.) 29 July 2004
D2: US 2009-0182815 A1 (J. CZECHOWSKI, III et al.) 16 July 2009
D3: US 2007-0165629 A1 (S. K. CHATURVEDI et al.) 19 July 2007
D4: US 2008-0273541 A1 (A. PHAM) 06 November 2008

1. Novelty and Inventive Step

1.1 Regarding independent claim 1, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for receiving, by a first endpoint, a *communication peer-to-peer communication session* between a second endpoint and a third endpoint in a hybrid peer-to-peer network comprising (fig. 5):
" sending, by the first endpoint, a first request to an access server in the hybrid peer-to-peer network, wherein the first request includes information that enables the access server to identify a session entry corresponding to the ongoing communication session from a plurality of session entries corresponding to a plurality of communication sessions (lines 1-6 in para. [0065]);
" receiving, by the first endpoint, a response to the first request from the access server, wherein the response includes a network address for a media server (lines 9-10 in para. [0067]);
" sending, by the first endpoint, a second request to the media server, wherein the second request includes information that enables the media server to identify a recording session corresponding to the ongoing communication session from a plurality of recording sessions corresponding to a plurality of communication sessions, wherein each recording session includes communications sent to the media server for recording by at least one endpoint in each of the plurality of communications sessions; and
" receiving, by the first endpoint via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints, wherein the first endpoint does not communicate with either of the second and third endpoints to receive the peer-to-peer communications.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'sending, by the first endpoint, a second request to the media server and receiving, via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box No. V

1.2 Regarding independent claim 18, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network comprising (fig. 4):
- identifying, by the first endpoint, the ongoing communication session from a plurality of communication sessions (lines 1-9 in para. [0040]);
- obtaining from a server, by the first endpoint, first communications occurring between the second and third endpoints that correspond to the ongoing communication session, wherein the server is configured to receive the first communications from the first and second endpoints for recording (lines 1-12 in para. [0050]);
- establishing, by the first endpoint, a communication leg directly with the second endpoint, wherein the communication leg is capable of carrying second communications from the first endpoint to the second endpoint; and
- sending, by the first endpoint, the second communications to the second endpoint.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'establishing, by the first endpoint, a communication leg directly with the second endpoint and sending the second communications to the second endpoint'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 18 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.3 Claim 2-17 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.4 Claim 19-22 are dependent on claim 18 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-22 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,937	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/051877	International filing date *(day/month/year)* 16 September 2011 (16.09.2011)	Priority date *(day/month/year)* 24 September 2010 (24.09.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 26 March 2013 (26.03.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Nora Lindner e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**13 APRIL 2012 (13.04.2012)**
Applicant's or agent's file reference DAMA-30,937	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/051877	**15 SEPTEMBER 2011 (15.09.2011)**	24 SEPTEMBER 2010 (24.09.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/18(2006.01)i, G06F 15/16(2006.01)i, G06F 17/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	13 APRIL 2012 (13.04.2012)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0006076 A1 (JINDAL DINESH K.) 01 January 2009
D2: US 06161082A A (GOLDBERG; RANDY G. et al.) 12 December 2000
D3: US 2010-0223047 A1 (CHRIST OLIVER) 02 September 2010
D4: US 2010-0299150 A1 (FEIN GENE S. et al.) 25 November 2010

1. Novelty and Inventive Step

D1 and D2, which is considered to be close prior art to the subject matter of claim 1 of the present invention, discloses a method for communicating, by a first endpoint, in an ongoing peer-to-peer communication session between the first endpoint and a second endpoint in a hybrid peer-to-peer network comprising:
establishing, by the first endpoint, a communications route directly between the first endpoint and the second endpoint, wherein signaling communications are sent directly from the first endpoint to the second endpoint via a signaling path provided by the communications route (see column 3 lines 1-6, 20-25 in D2);
receiving, by the first endpoint, audio speech input in a first spoken language from a user of the first endpoint (see paragraph [0023]; claim 1 in D1);
determining, by the first endpoint, whether the audio speech input is to be translated from the first spoken language to a second spoken language (see column 5 lines 25-34 in D2); and
sending, by the first endpoint, the audio speech input to a language translation component accessible to the first endpoint via the hybrid peer-to-peer network if the audio speech input is to be translated from the first spoken language to the second spoken language, wherein the first endpoint does not send the audio speech input directly to the second endpoint if the audio speech input is to be translated from the spoken language to the second spoken language (see paragraph [0023]; claim 1 in D1).

However, the subject matter of claim 1 differs from these prior art documents in sending, by the first endpoint, the audio speech input directly to the second endpoint via the communications route if the audio speech input is not to be translated from the first spoken language to the second language. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Continued on Supplemental Box

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 10 differs from these prior art documents in notifying, by the first endpoint, a language translation component in the hybrid peer-to-peer network of the inbound port, wherein the language translation component is accessible to the first endpoint via the hybrid peer-to-peer network, and wherein the notifying instructs the language translation component to send audio received from the endpoint to the inbound port. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 10 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 18 differs from these prior art documents in performing an authentication process with an access server in a hybrid peer-to-peer network, wherein the authentication process authorizes the first endpoint to access the hybrid peer-to-peer network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 19 and 20 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30.960	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/055101	International filing date *(day/month/year)* 06 October 2011 (06.10.2011)	Priority date *(day/month/year)* 11 October 2010 (11.10.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 16 April 2013 (16.04.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Bécamel e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F.BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**22 MAY 2012 (22.05.2012)**
Applicant's or agent's file reference DAMA-30.960	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/055101	**06 OCTOBER 2011 (06.10.2011)**	11 OCTOBER 2010 (11.10.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/58(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	21 MAY 2012 (21.05.2012)	Lee Hyoung Il Telephone No.82-42-481-8199

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-26	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-26	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0130650 A1 (THOMAS CREAMER et al.) 16 June 2005
D2: US 2009-0088150 A1 (CHATURVEDI SIVAKUMAR et al.) 02 April 2009
D3: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D4: US 2010-0011111 A1 (VIZAEI MOHAMMAD) 14 January 2010

1. Novelty and Inventive Step

1.1 Claims 1-13

The subject matter of claim 1 differs from these prior art documents in receiving an inbound call, wherein the inbound call is received via one of a cellular network and a public switched telephone network and continuing the inbound call on the one of the cellular network and the public switched telephone network on which the inbound call was received if the acknowledgement message has not been received. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-13 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

1.2 Claims 14-20

The subject matter of claim 14 differs from these prior art documents in receiving a first plurality of digits identifying a first destination device and initiating an outbound call to the first destination device based on the first plurality of digits, wherein the outbound call is initiated vis one of a cellular network and a public switched telephone network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 14 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 15-20 are dependent on claim 14 and therefore meet the requirements of PCT Article 33(2) and (3).

[Continued on Supplemental Box]

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Figures 2a-2c, 10A-10B and 11A-11B do not comply with PCT Rule 11.13(k) because the different figures shall not be numbered in Arabic numerals consecutively and independently of the numbering of the sheets.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

[Box V]

1.2 Claims 21-26

Claim 21 relates to an endpoint to perform the method according to claim 14. Claim 21 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3), because the subject matter of claim 14 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

Claims 22-26 depend on claim 21 and consequently they are also considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-26 are industrially applicable under PCT Article 33(4).

Electronic Acknowledgement Receipt

EFS ID:	17629895
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	13-DEC-2013
Filing Date:	11-SEP-2013
Time Stamp:	15:58:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	DAM31813IDS3.pdf	620804 c58ea33b2f8db0eb6a2dc9dbfa6f64ff2e03834f	no	21

Warnings:	
Information:	

2	Foreign Reference	9-DAMA-EP1848163A1.pdf	1543156 ad04d733d8d6a89ab98b0e9943ba07495fd00320	no	26
Warnings:					
Information:					
3	Foreign Reference	10-DAMA-EP1988698A1.pdf	1137334 5c5a926ae8b887e3bb395b34f279c07c7d3f8f49	no	22
Warnings:					
Information:					
4	Foreign Reference	11-DAMA-EP1988697A1.pdf	959154 4b7ee67e886f754b851be2754b892daa9aab2760	no	18
Warnings:					
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5	Foreign Reference	13-DAMA-WO2006064047.pdf	7867387 5f999e34b49f64f5a44d6d7f6489cf04079e6891	no	32
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6	Foreign Reference	12-DAMA-EP1638275.pdf	17068890 60b9df5bbc0e9896c229f8e48f109633392ffc8d	no	66
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7	Foreign Reference	14-DAMA-EP1603339.pdf	8817581 979fab7510f3846c1d3c9676affe0df7e27d7243	no	26
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8	Non Patent Literature	32-ISR-024870.pdf	532273 82927f31e6bd17d0865257f6025a63c865eafed1	no	12
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9	Non Patent Literature	33-ROSENBERG.pdf	21933728 ad24e2c0234de4d5c4d13c3ca42a50a112799508	no	62
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10	Non Patent Literature	34-ISR-028685.pdf	431648 fe037982d9e3bf15bfcbd8afac1e2db7f5e99de5	no	10
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Information:					

11	Non Patent Literature	35-ISR-029954.pdf	393095 70959c43d32d5f6c751695fa8095ce376da3fafa	no	8
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12	Non Patent Literature	36-ISR-024891.pdf	467209 f0e9a4dab1e69c75019453cb3336b68a135e14db	no	9
Warnings:					
Information:					
13	Non Patent Literature	37-ISR-031245.pdf	614941 558511489b955786 3dd36b468d35fae54ebd83a6	no	13
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Information:					
14	Non Patent Literature	40-WAP-WTLS.pdf	1346451 5f97b617de2db5c661087515 4beffd20dc9f9e6b	no	99
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15	Non Patent Literature	41-ISR-040864.pdf	358952 b1ebc8a193e00decd69721d9ef98780a8e8cb7bb	no	8
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16	Non Patent Literature	39-ISR-41565.pdf	338194 9c220a50111a5bd8af1f5c4bd9b98fe0056d6518	no	7
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18	Non Patent Literature	42-ISR-049000.pdf	1126180 e9d2a3471f1f33f4caf26aaf18351de5788a7daf	no	10
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Information:					

20	Non Patent Literature	44-ISR-055101.pdf	899083 8c2ad4d8462d4ec4354f44ab816fb71e9b046bd5	no	9
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21	Non Patent Literature	48-KARPAGAVINAYAGAM.pdf	766613 aef942f05c5925e1d97ce9e9ac576616caaa9da1	no	6
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22	Non Patent Literature	46-NiceLog.pdf	2595594 9903017e3ef7f65c0ee3f67e3de1573094d03b46	no	194
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23	Non Patent Literature	45-WISPA.pdf	425572 abb94584aed752d79dfacc4f878d920b5cae20ed	no	46
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Information:					
24	Non Patent Literature	47-IPRP-024870.pdf	256056 1f232dbf599e79097151ab5394a3db138fa8a4bc	no	7
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26	Non Patent Literature	50-MAHY.pdf	559578 f12ae1c25c0d8ed94b65e0af26139accfa70e409	no	16
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28	Non Patent Literature	54-Dierks-TLS.pdf	1814932 a521b560958c41e583ad58a934a216045ebe47c6	no	40
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Information:					

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33	Non Patent Literature	57-IPRP-029954.pdf	198238 9a3d30cf8ba2a3d08fd11cd544b6d08dd730a18d	no	5
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39	Non Patent Literature	64-Srisuresh.pdf	1288579 ee510272066f9038718bc5d67aac7aea8aad6b34	no	33
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42	Non Patent Literature	65-IPRP-040864.pdf	827916 bf8bd854f8991ec02c1a9b8628632d024e484568	no	6
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44	Non Patent Literature	67-IPRP-049000.pdf	910900 6bce2523822e0ce31b2beb1b06c13975ba39124c	no	6
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45	Non Patent Literature	68-IPRP-051877.pdf	219565 36cd1ef391840f48aed81cb15fb9a8b52f91342e	no	5
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Information:					
46	Non Patent Literature	69-IPRP-055101.pdf	197803 f82e64fcf19fe663609af4428cafe314cc16119c	no	6
Warnings:					
Information:					

Total Files Size (in bytes):	95581951

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

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

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

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/024,027	09/11/2013	2819	730	DAMA-31813	22	3

CONFIRMATION NO. 8381

25883
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

FILING RECEIPT

OC00000064028679

Date Mailed: 10/02/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)
SIVAKUMAR CHATURVEDI, ALLEN, TX;
SATISH GUNDABATHULA, IRVING, TX;
RASHMI HIREMATH, ALLEN, TX;

Applicant(s)
DAMAKA, INC., Richardson, TX

Assignment For Published Patent Application
DAMAKA, INC., Richardson, TX

Power of Attorney: The patent practitioners associated with Customer Number 25883

Domestic Priority data as claimed by applicant
This appln claims benefit of 61/846,958 07/16/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 09/25/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/024,027**
Projected Publication Date: 01/22/2015
Non-Publication Request: No
Early Publication Request: No
**** SMALL ENTITY ****

Title

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Preliminary Class

326

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813

CONFIRMATION NO. 8381

25883
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

FORMALITIES LETTER

OC000000064028680

Date Mailed: 10/02/2013

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing.

Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- Additional claim fees of $ **80** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

Total fee(s) required within **TWO MONTHS** from the date of this Notice is $ **80** for a small entity
- Total additional claim fee(s) for this application is $ **80**
  - $ **80** for **2** total claims over 20.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

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

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/024,027

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2	x 40 =	80	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	810		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813

CONFIRMATION NO. 8381

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POA ACCEPTANCE LETTER

OC000000064028751

Date Mailed: 10/02/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/11/2013.

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.

/atesfaye/

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	CHATURVEDI, Sivakumar
Serial No.:	14/024,027
Confirmation No.:	8381
Filed:	September 11, 2013
Group:	2819
Examiner:	to be assigned
For:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Mail Stop: Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

RESPONSE TO MISSING PARTS NOTICE

Enclosed are the following items for filing in the above-referenced U.S. Patent Application:

1. Fees in the amount of $80 to cover the required fees. Please charge any additional fees or deficiencies in fees or credit any overpayment to Deposit Account No. 20-0780/DAMA-31813 of HOWISON & ARNOTT, L.L.P.

Respectfully submitted,
HOWISON & ARNOTT, L.L.P.
Attorneys for Applicant(s)

/Timothy F. Bliss Reg. #50925/
Timothy F. Bliss
Registration No. 50925

TFB/kh
P.O. Box 741715
Dallas, Texas 75374-1715
Tel: 972-479-0462
Fax: 972-479-0464
October 2, 2013

Electronic Patent Application Fee Transmittal

Application Number:	14024027
Filing Date:	11-Sep-2013
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Filer:	Timothy Frank Bliss/Keith Harden
Attorney Docket Number:	DAMA-31813

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Claims in excess of 20	2202	2	40	80
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**80**

Electronic Acknowledgement Receipt	
EFS ID:	17020605
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	02-OCT-2013
Filing Date:	11-SEP-2013
Time Stamp:	15:24:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$80
RAM confirmation Number	1917
Deposit Account	200780
Authorized User	

File Listing:

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

1	Miscellaneous Incoming Letter	dam31813MISSINGPARTSSubmission.pdf	63619 26ec45b43cef7be9e695fe4c26d5ab5e8c08d3eb	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30352 cbd6868c1ed42cdfe1f535661d54156a54dda2de	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	93971		

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

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

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

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

PTO/AIA/82A (07-12)
Approved for use through 11/30/2014. 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.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

Application Number	
Filing Date	
First Named Inventor	CHATURVEDI, Sivakumar
Title	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
Art Unit	
Examiner Name	
Attorney Docket Number	DAMA-31813

SIGNATURE of Applicant or Patent Practitioner

Signature	/Timothy F. Bliss Reg. #50925/	Date	09/11/2013
Name	Timothy F. Bliss	Telephone	972-479-0462
Registration Number	50925		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications.

☒ *Total of 1 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.

PTO/AIA/82B(07-12)
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

25883

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

Name	Registration Number	Name	Registration Number

Please recognize or change the correspondence address for the application identified in the attached transmittal letter 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 Applicant:

☐ Inventor or Joint Inventor

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (*e.g.*, a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)

SIGNATURE of Applicant for Patent

Signature		Date	9/10/2013
Name	SILVA CHRISTOFOULOS	Telephone	972 [illegible]
Title and Company	CEO DAMAKA, INC.		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms for more than one signature, see below *.

☒ *Total of 1 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.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Attorney Docket No. DAMA-31813 Worldwide Rights

ASSIGNMENT AND DECLARATION UNDER 37 C.F.R. § 1.63

(For Use with Signed Application Data Sheet)

Title of Invention: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

This assignment and declaration are directed to (check one):

- ☐ the attached application;
- ☒ the application identified by the attorney docket no. and title of invention given above;
- ☐ United States Application or PCT International Application No. _____, filed _____.

ASSIGNMENT

For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, as a below-named inventor I have sold and assigned, and by these presents hereby sell and assign, unto:

Name of Assignee: **DAMAKA, INC.**

Address of Assignee: **2460 N. CENTRAL EXPRESSWAY, #202, RICHARDSON, TX 75080**

(hereinafter ASSIGNEE) all my right, title and interest in and to the above-identified invention in any form or embodiment thereof, in the United States and all foreign countries, including applications for patents in the United States and all countries of the world and through the Patent Cooperation Treaty and/or the European Patent Convention, including any and all applications claiming priority thereto such as divisions or continuations thereof, and in and to any and all patents granted in the United States and all countries of the world that may issue on any such applications or for said invention, including any and all reissues or extensions thereof, to be held and enjoyed by said ASSIGNEE, its successors, or assigns to the full end of the term or terms for which any and all such patents may be granted as fully and entirely as would have been held and enjoyed by me had this Assignment not been made.

I hereby authorize and request the Director of the U.S. Patent and Trademark Office to issue any and all Letters Patent of the United States to said ASSIGNEE, its successors, or assigns in accordance herewith.

I warrant and covenant that I have the full and unencumbered right to sell and assign the interests herein sold and assigned and that I have not executed and will not execute any document or instrument in conflict herewith.

I further covenant and agree that I will communicate to said ASSIGNEE, its successors, legal representatives, or assigns all information known to me relating to said invention or patent application and that I will execute and deliver any papers, make all rightful oaths, testify in any legal proceedings, and perform all other lawful acts deemed necessary or desirable by said ASSIGNEE, its successors, legal representatives, or assigns to perfect title to said invention, to said application including divisions and continuations thereof and to any and all patents that may be granted therefor or thereon, including reissues or extensions, in said ASSIGNEE, its successors, or assigns, or to assist said ASSIGNEE, its successors, legal representatives, or assigns in obtaining, reissuing, or enforcing patents for said invention.

DECLARATION

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

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Signature: _____ 9/10/2013

Sivakumar CHATURVEDI

Inventor: DATE

Attorney Docket No. DAMA-31813 Worldwide Rights

ASSIGNMENT AND DECLARATION UNDER 37 C.F.R. § 1.63

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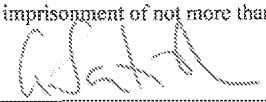
DECLARATION

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Signature:  9/10/2013

Satish GUNDABATHULA

Inventor: DATE

Attorney Docket No. DAMA-31813 Worldwide Rights

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Signature: _____ 04/10/2013

Rashmi HIREMATH

Inventor: DATE

Electronic Patent Application Fee Transmittal	
Application Number:	
Filing Date:	
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	Sivakumar Chaturvedi
Filer:	Timothy Frank Bliss/Keith Harden
Attorney Docket Number:	DAMA-31813
Filed as Small Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Claims in excess of 20	2202	2	40	80
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		810

Electronic Acknowledgement Receipt

EFS ID:	16825182
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	Sivakumar Chaturvedi
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	11-SEP-2013
Filing Date:	
Time Stamp:	15:47:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$730
RAM confirmation Number	2616
Deposit Account	200780
Authorized User	

File Listing:

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

1	Application Data Sheet	dam31813ADS.pdf	1255786 5d3529c4038bb03fe3d5ac5ecbdeb4e25f525dc0	no	7
Warnings:					
Information:					
2		dam31813PATApp.pdf	157182 15b1d13d4615d7038594133a0193746803c31f11	yes	34
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	29	
	Claims		30	33	
	Abstract		34	34	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	dam31813drawings.pdf	51328 836f8ebcab073cd9b263298d201a7435e3594b41	no	12
Warnings:					
Information:					
4	Power of Attorney	DAM31813POA.pdf	164677 143598d4fadb87d03ff65fd1e05ab1a4a64c5991	no	3
Warnings:					
Information:					
5	Oath or Declaration filed	DAM31813DECASSMTChaturvedi.pdf	76099 0a31a90ea546aa3f2b8ce5e6329e0ba4ae2f4c55	no	1
Warnings:					
Information:					
6	Oath or Declaration filed	DAM31813DECASSMTGundabathula.pdf	76080 ab6a6db2fb938cf9cc79e7ed6a46a042ffb528489	no	1
Warnings:					
Information:					
7	Oath or Declaration filed	DAM31813DECASSMTHiremath.pdf	74953 c6179644496af295300901a2020cd50b7faf84f5	no	1
Warnings:					
Information:					

8	Fee Worksheet (SB06)	fee-info.pdf	33346 c5ae665e61697af237bd437cf15d4117b1e89eed	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1889451	

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PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
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Legal Name

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	SIVAKUMAR		CHATURVEDI	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	ALLEN	State/Province	TX	Country of Residence i	US

Mailing Address of Inventor:

Address 1	1210 Cordova Drive		
Address 2			
City	Allen	State/Province	TX
Postal Code	75013	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	SATISH		GUNDABATHULA	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	IRVING	State/Province	TX	Country of Residence i	US

Mailing Address of Inventor:

Address 1	1235 Nocona Drive		
Address 2			
City	Irving	State/Province	TX
Postal Code	75063	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	RASHMI		HIREMATH	

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City	ALLEN	**State/Province**	TX	**Country of Residence** i	US

Mailing Address of Inventor:

Address 1	700 Longwood Drive		
Address 2			
City	Allen	**State/Province**	TX
Postal Code	75013	**Country** i	US

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Application Information:

Title of the Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER		
Attorney Docket Number	DAMA-31813	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		**Suggested Figure for Publication (if any)**	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61846958	2013-07-16

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Foreign Priority Information:

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
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☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

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In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

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Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

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Name of the Deceased or Legally Incapacitated Inventor :	
If the Applicant is an Organization check here. ☒	
Organization Name	DAMAKA, INC.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
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Mailing Address Information:			
Address 1	2460 N. CENTRAL EXPRESSWAY, #202		
Address 2			
City	RICHARDSON	**State/Province**	TX
Country i	US	Postal Code	75080
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Signature	/Timothy F. Bliss Reg. #50925/			Date (YYYY-MM-DD)	2013-09-11
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR UNITED STATES PATENT

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Inventor(s):

Sivakumar CHATURVEDI – Allen, Texas

Satish GUNDABATHULA – Irving, Texas

Rashmi HIREMATH – Allen, Texas

Attorneys:

Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, Texas 75374-1715
(972) 479-0462

Ex.1079 / IPR2026-00210 / Page 963 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent No. 61/846,958, filed on July 16, 2013, which is hereby incorporated by reference in its entirety.

Ex.1079 / IPR2026-00210 / Page 964 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

BACKGROUND

[0002] The manner in which functionality is accessed in certain environments, such as mobile device environments, may impact performance and/or battery life. Accordingly, what is needed are a system and method that addresses these issues.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] For a more complete understanding, reference is now made to the following description taken in conjunction with the accompanying Drawings in which:

[0004] FIG. 1 illustrates one embodiment of a device having a memory and a superblock stored within the memory;

[0005] FIG. 2A illustrates one embodiment of the device of FIG. 1 with the addition of a function block;

[0006] FIG. 2B illustrates one embodiment of the device of FIG. 2A with a superblock application displayed simultaneously with the additional functionality provided by a function block;

[0007] FIG. 3A illustrates one embodiment of the function block of FIG. 2 incorporated into the superblock;

[0008] FIG. 3B illustrates one embodiment of the superblock of FIG. 3A nested within another superblock;

[0009] FIG. 3C illustrates one embodiment of the function block of FIG. 2 incorporated into the superblock in multiple parts;

[0010] FIG. 4 illustrates one embodiment of a timeline showing the execution of superblock and function block instructions;

[0011] FIG. 5 illustrates a sequence diagram of one embodiment of a process that may be executed to access the functionality provided by the function block of FIG. 2;

[0012] FIG. 6A illustrates a flow chart of one embodiment of a process by which the function block may determine the services that can be provided to the superblock during the process of FIG. 5;

[0013] FIG. 6B illustrates one embodiment of a diagram showing a source and a sink coupled by the function block of FIG. 2;

[0014] FIG. 6C illustrates a more detailed embodiment of the diagram of FIG. 6B;

[0015] FIG. 7 illustrates a sequence diagram of one embodiment of a process that may be executed by the function block of FIG. 2 to respond to a service request from the superblock;

[0016] FIG. 8 illustrates a flow chart of one embodiment of a process by which the function block may determine whether to provide external services in responding to the service request of FIG. 7;

[0017] FIG. 9 illustrates a sequence diagram of one embodiment of a process that may be executed by the function block of FIG. 2 to respond to a notification from an external service;

[0018] FIG. 10 illustrates a flow chart of one embodiment of a process by which the function block may determine how to handle the notification of FIG. 9;

[0019] FIG. 11 illustrates one embodiment of a system that may be used for the device of FIG. 1; and

[0020] FIG. 12 illustrates one embodiment of the function block of FIG. 2.

DETAILED DESCRIPTION

[0021] It is understood that the following disclosure provides many different embodiments or examples. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are not intended to be limiting. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed.

[0022] Referring to FIG. 1, in one embodiment, a device 100 includes a memory 102. The memory 102 stores a superblock 104, which may be a set of executable instructions used to perform one or more functions via the device 100. For example, the device 100 may be a mobile device and the superblock 104 may be an application (the "superblock application") on the mobile device. The instructions of the superblock 104 enable a user of the mobile device to perform one or more actions, such as communications, data manipulation, and/or data management. However, the functionality of the superblock application is constrained to some degree by the device 100 and by the instructions of the superblock itself.

[0023] With respect to the device 100, the amount of available memory, how the memory 102 is structured (e.g., segment sizes), and how the memory is managed (e.g., how much memory is allocated to the superblock 104, how swapping occurs when another application needs physical memory, and how multiple applications are handled) are generally outside of the control of the superblock 104. However, mobile devices frequently provide a separate memory space for each application that is being run and so must keep track of the memory boundaries for each application. This tracking requires resources, such as processing time and power.

[0024] Furthermore, as a user switches between applications (e.g., switches contexts), the device 100 may have to swap instructions into and out of physical memory, which impacts performance and battery life. While context switching occurs in other devices, such as desktop and laptop computers, the resource impact used for those context switches is generally lower due to the greater amount of resources available for such devices compared to mobile devices. For example, as mobile devices generally have a smaller memory footprint compared to larger devices such as desktop and laptop computers, not only will a mobile device likely need to swap

files in and out of memory when a context switch occurs, but the processor load and battery life will likely be negatively impacted on the mobile device more than would occur on larger devices having more resources. In addition, while a single application may use multi-threading and therefore require the allocation of processor time for different threads, swapping between applications is generally a more resource intensive task for a mobile device.

[0025] With respect to the instructions of the superblock 104, additional functionality may be desired for the superblock application that is not provided by the instructions. For example, the superblock application may not currently support a particular type of data and/or operation (e.g., audio, video, email, and/or file transfer) and it may be desirable for the superblock application to do so. To provide such additional functionality, instructions would have to be added to the superblock 102 to give the superblock application the ability to support the data type and/or operation. This process typically entails reworking the superblock application to include the desired functionality and then releasing the updated version of the superblock application for use. Depending on the complexity and nature of the superblock application and the desired functionality, this process may take a substantial amount of time, effort, and/or expense.

[0026] One alternative is to use another application to provide the desired functionality, but this may not be a satisfactory solution. For example, assume the superblock 102 provides a superblock application that needs email functionality. On current mobile devices, a user would typically select a link in the superblock application, such as an email address. Selection of the link would launch an email application (or switch context to an email application if one is already running), which removes the user from the superblock application and places the user in the email application. The user would then compose and send the email before switching back to the superblock application. This process of leaving the superblock application, performing some other function, and then returning to the superblock application is currently a common occurrence for mobile device users.

[0027] However, this process is disruptive, difficult to manage, and pulls the user away from the superblock application while the provider of the superblock application may want the user to continue to stay in their application. Furthermore, the functions of the superblock application are not available while in the other application, and so the user may have to switch back and forth between the superblock application and the other application in order to interact with both

applications. This is inefficient and frustrating for the user, and may also increase the number of errors in the text of the email since both applications are not simultaneously available for reference.

[0028] Another example is a video window for a phone call. Assume a user is in the superblock application and has a question about data that the superblock application is displaying. In order to call and visually interact with someone about the question and still have access to the data, the user has to conduct the call while switching back and forth between the video window of the call and the superblock application. This is extremely disruptive to the user and limits the benefits of the video call, which include the ability to interact with someone on a visual basis rather than just an audio basis.

[0029] Yet another example is a user walking around a shop floor, engaged in his or her duties. In order to join a virtual meeting, the user will have to exit the superblock application, find and/or enter the meeting information using another application, and join the meeting using the other application. As with the preceding example, this is extremely disruptive to the user, wastes time, and lowers productivity.

[0030] Referring to FIGS. 2A and 2B, in another embodiment, the superblock 104 of FIG. 1 is illustrated with a function block 200 attached via a glue point 202 (FIG. 2A). It is understood that FIG. 2A is for purposes of illustration and may not represent an actual arrangement of the superblock 104 and function block 200 in the memory 102.

[0031] The function block 200 includes instructions for providing the superblock 104 with one or more functions (e.g., capabilities) that are not otherwise possessed by the superblock 104. Such functions are illustrated in part with respect to FIG. 12, and may include instant messaging, presence (e.g., online, offline, and away), audio, video, collaboration (e.g., sharing of applications, documents, and/or files), whiteboard, file transfer, email, backgrounding, push notifications, conferencing, meetings, and/or other functions. Continuing the previous examples, the function block 200 may provide email or video capabilities for the superblock 104 and does so by providing those capabilities within the superblock application. Although the functions need not be provided visually as shown in FIG. 2B (e.g., in the case of playing an audio file), visual functions may also be presented without leaving the superblock application display. In

other words, there is no need to switch context to an email application or to any other application in order to access the additional functionality provided by the function block 200.

[0032] To accomplish this, the function block 200 may be provided as a set of instructions that are included in the superblock 104. For example, the function block 200 may be provided as a software developer's kit (SDK) or as an otherwise independent module by a developer unrelated to the superblock 104. The developer of the superblock 104 may then compile or otherwise include the function block instructions in the superblock 104. This ensures that the function block 200 will occupy the same memory space as the superblock 104 unless otherwise placed elsewhere by the mobile device 100. For example, as the superblock 104 likely has little or no control over how the mobile device 100 handles memory management, the mobile device may actually separate some or all of the instructions making up the superblock 104 and the function block 200. However, by including the instructions for the function block 200 within the instructions for the superblock 104, the likelihood that the instructions will be separated may be minimized. The independent nature of the function block 200 means that the developer of the superblock 104 needs little information about the operation of the function block 100 other than how to access the services.

[0033] Furthermore, the function block 200 may be handled by developers as a single block of instructions or as multiple blocks depending on the operating system environment. For example, the function block 200 may be handled as a single block in an environment such as iOS (a mobile operating system developed and distributed by Apple Inc. of Cupertino, California), while the function block 200 may be handled as multiple blocks in an environment such as Android (a mobile operating system released as open source by Google Inc. of Mountain View, California).

[0034] The function block 200 may be configurable after being distributed as part of the superblock application. For example, the function block 200 may provide access to certain parameters, such as network address information of a server for the external services 204. Other parameters, such as call parameters (e.g., payload size) may also be configurable.

[0035] The function block 200 may provide services in a self-contained manner (e.g., internal services that may be provided without needing support outside of the device 100) or may

use one or more external services 204. The external services 204 may be provided via a server, a peer-to-peer endpoint, and/or by any other source with which the function block 200 is able to communicate. For example, the function block 200 may be able to provide audio/video playback services for a file stored in the memory 102 without needing anything outside of the device 100, assuming the device 100 includes a screen for displaying the video and speakers and/or a headset for sound output.

[0036] However, for an audio/video call session, the function block 200 needs to connect to another device in order to establish the session, even though it can play audio/video locally. In order to connect to the other device, the function block 200 may use the services 204. Accordingly, how the function block 200 handles a particular service request from the superblock 104 may depend on the specific service and the resource needs of that service. From the point of view of the superblock 104, whether the function block 200 uses local and/or external services does not matter as the superblock 104 is simply requesting the service from the function block 200. In embodiments that use an external service 204, the function block 200 is the entity between the superblock 104 and the external service 204, but does not control either the superblock 104 or the external service 204.

[0037] In the case of a request from the external services 204 (e.g., an incoming file transfer or phone call), the handling performed by the function block 200 may also depend on the specific service and the resource needs of that service. For example, the function block 200 may send a notification to the superblock 104 and wait for a response, or may handle the externally initiated request according to defined parameters.

[0038] Returning to the previous examples, the function block 200 may provide the superblock application with email functionality that enables a user to receive notifications, check email, and compose/edit/send/manage email without leaving the superblock application. For the audio/video phone call, the function block 200 may provide a video window for the phone call within the display of the superblock application, enabling a user to simultaneously see the video window and the superblock application. The video window may be resizable and/or movable. For the user walking around on the shop floor, the function block 200 may enable the user to receive a meeting notification, accept the meeting, and enter the meeting, all within the superblock application. To accomplish this, the function block 200 may hook into the meeting information (e.g., on a server) and render this in the superblock application.

[0039] Referring to FIG. 3A, one embodiment of the superblock 104 illustrates the role of the glue point 202 in enabling the superblock 104 to interact with the function block 200. For example, the glue point 202 may be an application programming interface (API) and the superblock 104 may make API calls to the function block 200 to access the function block's capabilities. The function block 200 then provides services to the superblock 104 in response to the API calls. In some embodiments, the function block 200 may also provide notifications to the superblock 104 in response to events triggered by the external services 204.

[0040] In the present example, the set of instructions that make up the function block 200 may be used with many different applications and on many different platforms and accessed via the API 202, although some customization may be performed if needed or desired. The function block 200 may be viewed as a set of instructions providing intelligence needed to perform the tasks described herein, and that set of instructions may be compiled or otherwise incorporated into the instructions of the superblock 104. As the instructions can be incorporated into many different applications to satisfy many different needs, some of the capabilities provided by the function block 200 may not be used by a particular application, but may still be present. In other embodiments, functionality that is not desired may be removed to minimize the footprint of the function block 200.

[0041] One embodiment of a header for the function block 200 (referred to in the header text as the Amadeo block) may be as follows:

```
#ifndef AMADEOBLOCK_H
#define AMADEOBLOCK_H
#include <string>
#include <list>
#include "AmadeoBlockConfig.h"
#include "AmadeoBlockCB.h"
class AmadeoBlock
        {
        public:
                static AmadeoBlock& instance();
                static bool UnlockSDK( const std::string& key );
```

```
virtual bool Initialize( const AmadeoBlockConfig& config, AmadeoBlockCB* callback ) = 0;
virtual bool Finalize() = 0;
virtual bool Activate() = 0;
virtual bool Deactivate() = 0;
virtual bool SetPresence( const std::string& presence, const std::string& text ) = 0;
virtual bool AddContact( const std::string& contact, const std::string& displayname, const std::string& group ) = 0;
virtual bool DeleteContact( const std::string& contact, const std::string& group ) = 0;
virtual bool MoveContact( const std::string& contact, const std::string& fromgroup, const std::string& togroup, const std::string& nickname ) = 0;
virtual bool CopyContact( const std::string& contact, const std::string& newgroup, const std::string& nickname ) = 0;
virtual bool AuthorizeContact( const std::string& contact, const std::sring& group ) = 0;
virtual bool RejectContact( const std::string& contact ) = 0;
virtual bool BlockContact( const std::string& contact ) = 0;
virtual bool UnblockContact( const std::string& contact ) = 0;
virtual bool AddGroup( const std::string &group ) = 0;
virtual bool DeleteGroup( const std::string& group ) = 0;
virtual bool RenameGroup( const std::string& oldgroup, const std::string& newgroup ) = 0;
virtual bool Search( const std::string& searchstring ) = 0;
virtual bool SendIM( const std::string& who, const std::string& msg ) = 0;
virtual bool StartIMConf( std::string& roomid, const std::list<std::string>& contacts, const std::string& subject ) = 0;
virtual bool EndIMConf( const std::string& roomid ) = 0;
virtual bool AcceptIMConf( const std::string& roomid ) = 0;
virtual bool SendConfIM( const std::string& roomid, const std::string& msg ) = 0;
```

```
virtual bool AddPartyIMConf( const std::string& roomid, const std::string& invitee ) = 0;
virtual bool StartFT( std::string& sessionid, const std::string& to, const std::string& filename ) = 0;
virtual bool AcceptFT( const std::string& sessionid, const std::string& pathtosave ) = 0;
virtual bool CancelFT( const std::string& sessionid ) = 0;
virtual bool DeclineFT( const std::string& sessionid ) = 0;
virtual bool CallStart( const std::string& calledparty, std::string& callid, bool startvideo ) = 0;
virtual bool CallAccept( const std::string& callid, bool startvideo ) = 0;
virtual bool CallEnd( const std::string& callid ) = 0;
virtual bool CallHold( const std::string& callid ) = 0;
virtual bool CallUnhold( const std::string& callid ) = 0;
virtual bool CallMute( const std::string& callid ) = 0;
virtual bool CallUnmute( const std::string& callid ) = 0;
virtual bool AddVideo( const std::string& callid ) = 0;
virtual bool RemoveVideo( const std::string& callid ) = 0;
virtual bool CallTransfer( const std::string& callid, const std::string& transferparty ) = 0;
virtual bool CallForward( const std::string& callid, const std::string& forwardparty ) = 0;
virtual bool CallPark( const std::string& callid ) = 0;
virtual bool CallPickup( const std::string& slotid ) = 0;
virtual bool CallVoicemail( const std::string& callid ) = 0;
virtual bool CallMerge( const std::string& callid, const std::string& othercallid ) = 0;
virtual bool CallUnmerge( const std::string& callid ) = 0;
virtual bool SendDTMF( const std::string& callid, char digit ) = 0;
virtual bool Escalate( const std::string& callid, const std::list<std::string>& targets ) = 0;
```

```
                virtual bool Deescalate( const std::string& callid, const
std::list<std::string>& targets ) = 0;
                virtual bool VMRefresh() = 0;
                virtual bool VMFetch( const std::string& itemid ) = 0;
                virtual bool VMDelete( const std::string& itemid ) = 0;
                virtual bool VMPlay( const std::string& itemid ) = 0;
                virtual bool SharingStart( const std::string& callid ) = 0;
                virtual bool SharingStop( const std::string& callid ) = 0;
                virtual bool WBStart( const std::string& target, const std::string& wbid ) =
0;
                virtual bool WBEnd( const std::string& wbid ) = 0;
                virtual bool WBSend( const std::string& wbid, const std::string& wbdata )
= 0;
                virtual bool Logging(bool enable) = 0;
                virtual bool GoToBackground() = 0;
                virtual bool MonitorNetwork( bool checknetwork ) = 0;
        protected:
                AmadeoBlock();
        private:
                AmadeoBlock(const AmadeoBlock&);
                const AmadeoBlock& operator=(const AmadeoBlock&);
};
#endif // AMADEOBLOCK_H
```

[0042] Referring to FIG. 3B, another embodiment illustrates the superblock 104 as being part of another superblock 206. It is understood that any number of nested superblocks may be present. The function block 200 may be accessible to only the superblock 104, or may be accessible to one or more of the other superblocks (e.g., the superblock 206), either directly or via the superblock 104. For example, the superblock 206 may be able to make an API call directly to the function block 200 in some embodiments, or may only be able to make a call through the superblock 104 in other embodiments (e.g., the superblock 206 may call the superblock 104 for a service, and the superblock 104 may in turn make an API call to the function block 200 for that service).

[0043] Referring to FIG. 3C, as previously stated, it is understood that the function block 200 need not be a single block in memory. As illustrated by blocks 200a and 200b, the function block 200 may be separated into different parts automatically (e.g., due to the operation of the operating system and how it handles memory allocation) or may be handled as separate parts during integration into the superblock application (e.g., by the developer of the superblock application).

[0044] Referring to FIG. 4, one embodiment of a timeline 400 illustrates the simultaneous operation of the superblock 104 and function block 200 when the instructions of the function block 200 are being executed to provide one or more services to the superblock application. The timeline 400 moves from left to right and includes five specific times t_1-t_5. At time t_1, the superblock instructions (as indicated by line 402) are being executed, but the function block 200 instructions are not. In other words, the superblock application is in use and has not called the function block API to provide any services. It is understood that the function block 200 may be in a waiting state at time t_1 and instructions of the function block 200 may be executed to maintain the waiting state, but the function block 200 is not actively providing services.

[0045] At time t_2, the superblock application calls the function block API or an external service contacts the function block 200, and the function block 200 instructions (as indicated by line 404) are executed to provide the service requested by the API call or handle the contact from the external service 204. The instructions for the superblock 104 and function block 200 are executed from time t_2 until time t_3, at which time the function block 200 is no longer needed and is shut down (although this may include going into the waiting state for purposes of example). The superblock instructions are executed from time t_3 until time t_4, at which time the function block 200 is again called (as indicated by line 406). The instructions for the superblock 104 and function block 200 are executed from time t_4 until time t_5, at which time the function block 200 is no longer needed and is shut down (although this may include going into the waiting state for purposes of example) while the superblock instructions continue being executed.

[0046] Accordingly, while two different applications on a mobile device would not typically execute concurrently, the execution of the instructions for the superblock 104 and function block 200 as shown in FIG. 4 allows the function block 200 to provide additional capabilities to the superblock 104 through the use of API calls. By providing an interface for the function block

Ex.1079 / IPR2026-00210 / Page 977 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

200 such as an API, the instructions of the superblock 104 may require minimal modification to access the capabilities provided by the function block 200.

[0047] Referring to FIG. 5, a sequence diagram 500 illustrates one embodiment of a process that may be executed to access the functionality provided by the function block 200. The superblock 104 may use the function block 200 under a static model or a dynamic model. In the static model, the superblock 104 calls for a specific function (e.g., video), the function block 200 provides the requested function (if available), the superblock 104 consumes the services provided, and the function block 200 is shut down. In the dynamic model, the function block 200 may enter a waiting state and wait for a request from the superblock 104 and/or a request or another event trigger from the external services 204 (e.g., an incoming call, email, or file transfer), handle the request, and then resume the waiting state.

[0048] In step 502, the superblock 104 unlocks the function block 200. For example, the unlock process may indicate that the superblock 104 is authorized to unlock some or all of the functionality provided by the function block 200 by providing a key or other authorization indicator. This step may not only limit the superblock 104 to authorized functionality, but may also insure that other applications cannot access the function block's capabilities. In step 504, the function block 200 is initialized. It is noted that these steps may occur during initialization of the superblock 104 or may occur later, such as when the superblock 104 calls the function block 200 for a particular function. For example, steps 502 and 504 may occur when the superblock application is launched and may not be repeated while the superblock application remains open, may occur each time the superblock application calls the function block API for a service, may occur only for particular services, may occur for defined periods of time (e.g., the function block 200 may lock every half hour), and/or using other parameters. It is understood that steps 502 and 504 may be reversed in some embodiments.

[0049] During initialization or at another time, policies may be applied. For example, a cost policy may require that any available Wi-Fi network is used before a 3G network. A security policy may require that a virtual private network (VPN) be used whenever available. Backgrounding may be selected as an option when available to allow the superblock application to run in the background. Accordingly, the function block 200 may be configured to provide for specific behavior if desired and this behavior may in turn limit or enhance the capabilities of the superblock 104.

[0050] In steps 506 and 508, the superblock 104 may provide login information to the function block 200, and the function block 200 may use this information to access the external services 204. For example, if the function block 200 needs authentication credentials to access the external services 204, steps 506 and 508 may be used to gain access to those external services. In some embodiments, steps 506 and/or 508 may be combined with step 502 and the unlocking of the function block 200 may include logging into whatever external services are authorized and/or available.

[0051] In step 510, the function block 200 and the superblock 104 may perform a capability exchange. More specifically, the function block 200 may determine whether (1) the function block 200 has a particular capability, (2) whether the function block 200 can render that capability, and (3) whether the superblock 104 can render that capability. For example, the function block 200 may determine that the function block 200 has the capability to capture audio and play that captured audio through a speaker.

[0052] Next, the function block 200 may determine whether it can render that capability by checking, for example, to see whether there is an available microphone (mic) input and an available speaker output. If one or both of the mic and speaker are not present, then the function block 200 has the capability to handle the audio, but not the capability to render the audio. The superblock 104 is not involved in this process as it is not needed to render the audio, so the third determination may not be made. Although the superblock 104 is not involved in rendering the audio, it is understood that the superblock 104 may visually represent the audio, such as by means of an icon, one or more control buttons (e.g., play and stop), and/or other visual representations.

[0053] In another example, the superblock 104 may desire to display video. Again, the function block 200 may determine that the function block 200 has the capability to handle the video. Next, the function block 200 may determine whether it can render that capability by checking, for example, to see whether there is an available screen. If a screen is not present, then the function block 200 has the capability to handle the video, but not the capability to render the video. In this example, the superblock 104 is involved in this process as it is needed to provide a video window to render the video (e.g., the function block 200 may provide the video data to be rendered and the superblock 104 may place that video data in a video window), so the third determination is made.

[0054] By making such determinations, the function block 200 is able to notify the superblock 104 of the available functions. If a function needs the external services 204, lack of a connection may prevent the function block 200 from delivering external services to the superblock 104, but local services may still be provided. It is understood that while a screen, speaker, or other destination (e.g., a sink) may not be available, the function block 200 may handle some services using a secondary sink, such as a memory to which the video or audio is stored for later use.

[0055] With additional reference to FIG. 6A, a flow chart 600 illustrates one embodiment of a process for the capability exchange of step 510 of FIG. 5. In step 602, the function block 200 may be initialized (in embodiments where the capability exchange is performed on initialization) or the function block 200 may receive a request for service (in embodiments wherein the capability exchange occurs when a service is requested).

[0056] In step 604, a determination is made as to whether the function block 200 has the particular capability. For example, whether the function block 200 has the capability to support an audio/video call. If the determination of step 604 is that the function block 200 does not have the particular capability, the method 600 moves to step 606 and the capability is indicated as not being available. It is noted that if a particular capability has not been unlocked, the function block 200 may indicate the capability is not available even if the function block 200 can actually provide the capability. If the determination of step 604 is that the function block 200 does have the particular capability, the method 600 moves to step 608.

[0057] In step 608, a determination is made as to whether the function block 200 can render the capability as described previously. This step may determine whether the device 100 supports the needed functionality (e.g., has a microphone if audio input is needed or a speaker if audio output is needed). If the determination of step 608 is that the function block 200 cannot render the capability, the method 600 moves to step 606 and the capability is indicated as not being available. If the determination of step 608 is that the function block 200 does have the capability, the method 600 moves to step 610.

[0058] In step 610, a determination is made as to whether an external service 204 is needed to provide the capability. If the determination of step 610 is that an external service 204 is not

needed, the method 600 moves to step 614. If the determination of step 610 is that an external service 204 is needed, the method 600 moves to step 612.

[0059] In step 612, a determination is made as to whether a needed external service 204 is available. For example, the external service 204 may be offline (e.g., a server used to provide the service may be non-responsive or the device 100 may have minimal or no network connectivity). This step may also determine whether the superblock application is authorized to access the external service 204 (e.g., whether the external service will allow access by the superblock application). If the determination of step 612 is that the needed external service 204 is not available, the method 600 moves to step 606 and the capability is indicated as not being available. If the determination of step 612 is that the needed external service 204 is available, the method 600 moves to step 614.

[0060] In step 614, a determination is made as to whether the superblock 104 is needed to render the capability as described previously. If the determination of step 614 is that the superblock 104 is not needed to render the capability, the method 600 moves to step 618 and the service is indicated as available (e.g., a capability list is updated and/or the service is provided). If the determination of step 614 is that the superblock 104 is needed to render the capability, the method 600 moves to step 616.

[0061] In step 616, a determination is made as to whether the superblock 104 can render the capability as described previously. If the determination of step 616 is that the superblock 104 cannot render the capability, the method 600 moves to step 606 and the capability is indicated as not being available. If the determination of step 616 is that the superblock 104 does have the capability, the method 600 moves to step 618.

[0062] The superblock 104 and/or function block 200 may use a table or other structure for listing available capabilities. For example, a table may identify a particular service, whether the superblock 104 is authorized to access the service, whether the function block 200 can support the service, whether the function block 200 can render the service, whether the superblock 104 is needed to render the service, and whether the superblock 104 can render the service if needed. It is understood that this information may not be provided in detail in all embodiments, but may be condensed to a simple indication of whether the service is available or not. However, by providing additional levels of detail, more useful indicators may be provided. For example, the

superblock application may be able to indicate that a particular service is not authorized or that speakers are not available, rather than simply indicating that audio service is not available.

[0063] Table 1 illustrates one embodiment of a mapping table that may be used to track the capabilities that the function block 200 can provide to the superblock 104 on the device 100. It is understand that the mapping table may vary for the same function block 200, superblock 104, and device 100 in different scenarios, such as whether the device 100 has network access or not when needed for a particular service. For purposes of illustration, the first column lists services supported by the function block 200, the second column identifies whether that service is supported by the device (e.g., whether the function block 200 can render the service), the third column identifies whether the superblock application can render the service (if needed), the fourth column identifies whether the external services 204 support the service (if needed), and the fifth column identifies where the superblock application has authorization rights to that service.

[0064] In some embodiments, the service column may be limited to services that the superblock application is authorized to access. For example, if function block 200 supports instant messaging but the superblock application 104 is not authorized to use this feature, the service may or may not show up in the mapping table depending on the particular implementation. An additional column may be used to identify whether a needed external service is currently available or the fourth column may be used to show this information.

SERVICE	DEVICE	SUPERBLOCK	EXTERNAL SERVICE	AUTH?
In app video from file	Yes	Yes	N/A	Y
Audio – local file	Yes	N/A	N/A	Y
Audio - streaming	Yes	N/A	Yes	Y
Sharing	Yes	Yes	No	Y
Instant messaging	Yes	No	Yes	Y
Whiteboard	N/A	N/A	N/A	N

Table 1

[0065] For purposes of example, the first service involves playing a video from a file and is supported by both the device 100 and the superblock 104. The external services 204 are not

needed and are marked as not applicable. The second service involves playing a local audio file and is supported by the device 100. The superblock 104 and external services 204 are not needed and are marked as not applicable. The third service involves playing a streaming audio file and is supported by the device 100 and the external services 204. The superblock 104 is not needed and is marked as not applicable. The fourth service involves content sharing and is supported by the device 100 and the superblock 104, but not the external services 204. As the external services 204 are needed for sharing in this example, this service is not available to the superblock application. The fifth service involves instant messaging and is supported by the device 100 and the external services 204, but not the superblock 104.

[0066] The sixth service involves a whiteboard, but the superblock 104 is not authorized to access this service, and so the capabilities are not checked. In other embodiments, capabilities for unauthorized services may be checked and, if supported, the superblock application may notify the user that the service is not authorized. In such embodiments, a dialog or other option may appear to allow the user to subscribe or otherwise gain access to the service if allowed.

[0067] With additional reference to FIG. 6B, a diagram 630 provides a visual illustration of the process of FIG. 6A from a source/sink perspective. For the function block 200 to successfully bridge a source 632 and a sink 634 to provide a service, both the source 632 and the sink 634 must be present and available to the function block 200 as indicated by lines 636 and 638, respectively. The source 632 may be the superblock 104, the external services 204, and/or a component of the device 100 such as a wireless interface, a microphone, a camera, and/or any other component capable of providing input to the function block 200. The sink 632 may be the superblock 104, the external services 204, and/or a component of the device 100 such as a wireless interface, a speaker, a display screen, and/or any other component capable of receiving output from the function block 200. In some cases, the lack of availability of a sink may result in the use of a dummy sink (e.g., writing audio to memory when there is no available speaker).

[0068] It is understood that the source/sink model provided by the source 632 and sink 634 may be viewed as generic. For example, at the device level, the source 632 and sink 634 operate to read/send data. At the network interface level, each side acts as both source/sink because network interfaces allow for read/write simultaneously in most modern devices. In contrast, a microphone is a source and a speaker is a sink. A speaker may serve as a sink for multiple data in some cases, such as if multiple audio sources are mixed into the single speaker. In this

scenario, the source for rendering audio data may be a microphone, network audio encoded data, a music file on the device, and/or other sources. The source/sink model can also be considered for service level consumer/producer models. For example, the function block 200 may be viewed as a source for presenting client side capabilities to a server and at the same time may be viewed as a sink for rendering capabilities presented by the server.

[0069] With additional reference to FIG. 6C, a diagram 640 provides a more detailed illustration of FIG. 6B. Source 642 is a microphone and the function block 200 is to send the audio captured from the microphone to sink 644 representing an external service 204 (e.g., as outbound audio for a telephone call). For the function block 200 to successfully bridge the source 642 and the sink 644, both the source 642 and the sink 644 must be present and available to the function block 200 as indicated by lines 646 and 648, respectively, and the source 642, sink 644, and function block 200 must be capable of handling the service. If the function block 200 is thought of as providing services via a series of switches, lines 646 and 648 must both be closed to connect the source 642 and sink 644. Accordingly, the process of FIG. 6A may be executed to ensure that the function block 200 can render the audio input and that the connection to the external service is valid (e.g., that the switches can be closed).

[0070] In the present example, one or more additional flow layers represented by line 650 may also present. For example, line 650 may represent whether an audio hold exists. If the audio has been placed on hold, the function block 200 will notify the audio pipeline to stop (e.g., the switch will be opened). The audio capture may continue, but it will not be rendered (e.g., sent to the external services represented by sink 644) as the circuit formed by the function block 200 will no longer be complete.

[0071] Referring again to FIG. 5, in step 512, the function block 200 may shut down if operating under the static model or may enter a wait mode if operating under the dynamic model. In step 514, the function block 200 may provide one or more services to the superblock 104 if requested by the superblock 104 or an external service 204. It is understood that steps 512 and 514 may repeat any number of times while the superblock application is running. If no services are requested, step 514 would not be executed.

[0072] In steps 516 and 518, the superblock 104 may finalize any service requests and shutdown the function block 200. For example, if the superblock application is closing, the

superblock 104 may use one or more API calls to the function block 200 to notify the function block 200 that the function block 200 should close any open ports (e.g., with an external service 204) and close down any running processes.

[0073] Referring to FIG. 7, a sequence diagram 700 illustrates one embodiment of a process that may be executed in order to provide a service by the function block 200 in response to a service request by the superblock 104. This present example may operate under either the static model or the dynamic model. The process begins with step 512 of FIG. 5, which is not described in detail in the present example.

[0074] In step 702, the superblock 104 issues a request for a service to the function block 200 using an API call or another suitable method. In step 704, the function block 200 obtains any needed support from the external services 204. In step 706, the function block 200 provides the service to the superblock 104. In step 708, the function block 200 may repeat step 512 and either shut down or enter the wait mode depending on whether the function block 200 is operating under the static model or the dynamic model.

[0075] Referring to FIG. 8, a flow chart 800 illustrates one embodiment of a process for accessing an external service 204, such as may occur with respect to step 704 of FIG. 7. In step 802, the function block 200 receives a request from the superblock 104 (as occurs in step 702 of FIG. 7). In step 804, a determination is made as to whether the function block 200 needs to use an external service to handle the request. If the determination of step 804 indicates that no external service is needed, the method 800 moves to step 806. In step 806, the service is provided by the function block 200. If the determination of step 804 indicates that an external service is needed, the method 800 moves to step 808.

[0076] In step 808, a determination is made as to whether the external service is available. If the determination of step 808 indicates that the external service is available, the method 800 moves to step 810, where any parameters needed for communications and/or service provision may be negotiated between the function block 200 and external service 204. Such parameters may include both signaling and media parameters such as bandwidth, codecs, and/or similar information, and would typically depend on the particular service.

[0077] The method 800 then moves to step 806 where the service is provided by the function block 200. If the determination of step 808 indicates that the external service is not available, the method 800 moves to step 812. In step 812, the function block 200 may indicate that the service is not available. For example, the function block 200 may indicate that the server is not responding or that there is no network connectivity for the device 100.

[0078] Referring to FIG. 9, a sequence diagram 900 illustrates one embodiment of a process that may be executed in order to provide a service by the function block 200 in response to a notification from an external service 204. This present example may operate under the dynamic model as the function block 200 is in listening mode to receive notifications from the external services 204. The process begins with step 512 of FIG. 5, which is not described in detail in the present example.

[0079] In step 902, an external service 204 issues a notification to the function block 200 that the external service 204 has something for the superblock 104. In step 904, the function block 200 may pass the notification to the superblock 104. It is understood that step 904 may not actually pass on the notification, but that the notification of step 902 may trigger functionality within the function block 200 that serves to notify the superblock 104. For example, if the notification of step 902 is about an incoming phone call, the function block 200 may receive the notification, initiate a phone response display (e.g., a display with options for accepting or rejecting the call), and provide the information to the superblock 104 in that manner. In another example, the notification of step 902 may be a presence change (e.g., a user changes status from offline to online), and the function block 200 may update a presence indicator within the superblock application's display. In still another example, the function block 200 may use an event system and send event notifications to the superblock 104. Accordingly, some notifications may require action on the part of a user of the superblock application, while other notifications may not.

[0080] In the present example, the notification requires a response and the superblock 104 responds in step 906 by requesting and/or accepting the service (e.g., a phone call). In step 908, the function block 200 handles services between the superblock 104 and the external service 204. In other words, the function block 200 serves as an interface between the external service 204 and the superblock 104. For example, the function block 200 may bridge the phone call, handle

Ex.1079 / IPR2026-00210 / Page 986 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

call waiting and other call features, and otherwise provide support for the superblock application. In step 910, the function block 200 may enter wait mode after the services have been provided.

[0081] Referring to FIG. 10, a flow chart 1000 illustrates one embodiment of a process for execution by the function block 200 with respect to an external service 204, such as may occur with respect to FIG. 9. In step 1002, the function block 200 receives a notification from the external service 204. In step 1004, a determination is made as to whether the function block 200 needs instructions from the superblock 104. If the determination of step 1004 indicates that instructions are needed, the method 1000 moves to step 1006. In step 1006, the function block 200 indicates to the superblock 104 that service is requested. The method 1000 then moves to step 1008.

[0082] In step 1008, a determination is made as to whether the service request has been approved by the superblock 104. If the determination of step 1008 indicates that the request has not been approved, the method 1000 moves to step 1010, where the notification may be rejected, ignored, or otherwise handled. It is understood that the actual response of the function block 200 in step 1010 may vary depending on the notification type. For example, the function block 200 may indicate to the external service 204 that the call is rejected. If the determination of step 1008 indicates that the request has been approved, the method 1000 moves to step 1012, where the function block 200 may handle the service provision.

[0083] Returning to step 1004, if the determination of step 1004 indicates that instructions are not needed, the method 1000 moves to step 1014. In step 1014, a determination is made as to whether the superblock 104 is to be updated based on the notification. If the determination of step 1014 indicates that the superblock 104 is not to be updated, the method 1000 moves to step 1010, where the notification may be rejected, ignored, or otherwise handled. If the determination of step 1014 indicates that the superblock 104 is to be updated, the method 1000 moves to step 1016, where the update may be performed. For example, another user's presence status may be updated from online to offline or vice versa.

[0084] Referring again to FIG. 1, embodiments of the device 100 include cellular telephones (including smart phones), personal digital assistants (PDAs), netbooks, tablets, laptops, desktops, workstations, telepresence consoles, and any other computing device that can communicate with another computing device using a wireless and/or wireline communication link. Such

communications may be direct (e.g., via a peer-to-peer network, an ad hoc network, or using a direct connection), indirect, such as through a server or other proxy (e.g., in a client-server model), or may use a combination of direct and indirect communications. Although not shown, in other embodiments, the device 100 may be an application specific integrated circuit (ASIC), a processor, or another device within which the function block 200 may be embedded. In some embodiments, external access may not be needed. Accordingly, the function block 200 may be implemented in many different ways and in many different types of systems, and may be customized as needed to operate within a particular environment.

[0085] Referring to FIG. 11, one embodiment of a system 1100 is illustrated. The system 1100 is one possible example of a device such as the device 100 of FIG. 1. The system 1100 may include a controller (e.g., a central processing unit ("CPU")) 1102, a memory unit 1104, an input/output ("I/O") device 1106, and a network interface 1108. The components 1102, 1104, 1106, and 1108 are interconnected by a transport system (e.g., a bus) 1110. A power supply (PS) 1112 may provide power to components of the computer system 1100, such as the CPU 1102 and memory unit 1104, via a power system 1114 (which is illustrated with the transport system 1110 but may be different). It is understood that the system 1100 may be differently configured and that each of the listed components may actually represent several different components. For example, the CPU 1102 may actually represent a multi-processor or a distributed processing system; the memory unit 1104 may include different levels of cache memory, main memory, hard disks, and remote storage locations; the I/O device 1106 may include monitors, keyboards, and the like; and the network interface 1108 may include one or more network cards providing one or more wired and/or wireless connections to a network 1116. Therefore, a wide range of flexibility is anticipated in the configuration of the computer system 1100.

[0086] The system 1100 may use any operating system (or multiple operating systems), including various versions of operating systems provided by Microsoft (such as WINDOWS), Apple (such as Mac OS X), UNIX, and LINUX, and may include operating systems specifically developed for handheld devices, personal computers, servers, and embedded devices depending on the use of the system 1100. The operating system, as well as other instructions (e.g., for the superblock 104 and function block 1100), may be stored in the memory unit 1104 and executed by the processor 1102. For example, if the system 1100 is the device 100, the memory unit 1104

may include instructions for performing some or all of the message sequences and methods described herein.

[0087] Referring to FIG. 12, in one embodiment, the function block 200 may contain functionality similar to that of an endpoint as described in detail in U.S. Patent No. 7,656,870, filed on March 15, 2005, and entitled SYSTEM AND METHOD FOR PEER-TO-PEER HYBRID COMMUNICATIONS and hereby incorporated by reference in its entirety. In such an embodiment, the graphical user interface (GUI) of the endpoint may be replaced with the API 202 of FIG. 2, and some functionality may be removed if not needed for a particular implementation of the function block 200. Other functionality that is not necessarily in the described endpoint, such as mobile device management (MDM) functionality, may be included in the function block 200. Accordingly, the basic functionality of the described endpoint may exist as logic embodied in the instruction set of the function block 200.

[0088] For purposes of example, the function block 200 may be accessed by the API 202 and may communicate with an operating system 1204 of the device 100 of FIG. 1. The API 202 provides access to the capabilities of the function block 200 for the superblock 104, while the operating system 1204 provides underlying functionality, as is known to those of skill in the art. Although shown as separate from the function block 200 for purposes of illustration, it is understood that the API 202 may be part of the function block 200 in some embodiments.

[0089] The function block 200 may include multiple components and layers that support the functionality required to perform the operations requested by the superblock 104. For example, the function block 200 may include a softswitch 1206, a management layer 1208, an encryption/decryption module 1210, a feature layer 1212, a protocol layer 1214, a speech-to-text engine 1216, a text-to-speech engine 1218, a language conversion engine 1220, an out-of-network connectivity module 1222, a connection from other networks module 1224, a p-commerce (e.g., peer commerce) engine 1226 that includes a p-commerce agent and a p-commerce broker, and a cellular network interface module 1228.

[0090] Each of these components/layers may be further divided into multiple modules. For example, the softswitch 1206 may include a call control module, an instant messaging (IM) control module, a resource control module, a CALEA (Communications Assistance to Law

Enforcement Act) agent, a media control module, a peer control module, a signaling agent, a fax control module, and a routing module.

[0091] The management layer 1208 may include modules for presence (i.e., network presence), peer management (detecting peers and notifying peers of being online), firewall management (navigation and management), media management, resource management, profile management, authentication, roaming, fax management, and media playback/recording management.

[0092] The encryption/decryption module 1210 may provide encryption for outgoing packets and decryption for incoming packets. In the present example, the encryption/decryption module 1210 provides application level encryption at the source, rather than at the network. However, it is understood that the encryption/decryption module 1210 may provide encryption at the network in some embodiments.

[0093] The feature layer 1212 may provide support for various features such as voice, video, IM, data, voicemail, file transfer, file sharing, class 5 features, short message service (SMS), interactive voice response (IVR), faxes, and other resources. The protocol layer 1214 may include protocols supported by the function block 200, including SIP, HTTP, HTTPS, STUN, RTP, SRTP, and ICMP. It is understood that these are examples only, and that fewer or more protocols may be supported.

[0094] The speech-to-text engine 1216 converts speech received by the function block 200 (e.g., via a microphone or network) into text, the text-to-speech engine 1218 converts text received by the function block 200 into speech (e.g., for output via a speaker), and the language conversion engine 1220 may be configured to convert inbound or outbound information (text or speech) from one language to another language. The out-of-network connectivity module 1222 may be used to handle connections between the function block 200 and the external services 204, and the connection from other networks module 1224 handles incoming connection attempts from the external services 204. The cellular network interface module 1228 may be used to interact with a wireless network.

[0095] While the preceding description shows and describes one or more embodiments, it will be understood by those skilled in the art that various changes in form and detail may be

made therein without departing from the spirit and scope of the present disclosure. For example, various steps illustrated within a particular flow chart or sequence diagram may be combined or further divided. In addition, steps described in one flow chart or diagram may be incorporated into another flow chart or diagram. Furthermore, the described functionality may be provided by hardware and/or software, and may be distributed or combined into a single platform. Additionally, functionality described in a particular example may be achieved in a manner different than that illustrated, but is still encompassed within the present disclosure. Therefore, the claims should be interpreted in a broad manner, consistent with the present disclosure.

Ex.1079 / IPR2026-00210 / Page 991 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

WHAT IS CLAIMED IS:

1. A mobile device comprising:

a network interface;

a processor coupled to the network interface; and

a memory coupled to the processor and configured to store a plurality of instructions executable by the processor, the instructions including instructions for:

receiving, by a function block stored in the memory of the mobile device, a request for an audio/video (A/V) call from a superblock application stored in the memory of the mobile device;

determining, by the function block, that the superblock application is authorized to access A/V call functionality provided by the function block;

determining, by the function block, that the A/V service requires access to a resource that is external to the mobile device;

establishing, by the function block, the A/V call between the superblock application and the resource via the network interface, wherein the establishing is not supported by the superblock application;

providing, by the function block, video output for the A/V call to a video window within a display window of the superblock application on the mobile device, wherein the video window is displayed simultaneously with the display window of the superblock application on a screen of the mobile device; and

providing, by the function block, audio for the A/V call via the mobile device.

2. The device of claim 1 wherein the instructions further include determining, by the function block, whether the function block has the capability to provide the A/V call.

3. The device of claim 2 wherein the instructions further include determining, by the function block, whether the function block has the capability to render the A/V call.

4. The device of claim 3 wherein the instructions further include determining, by the function block, whether the superblock has the capability to render the A/V call.

Ex.1079 / IPR2026-00210 / Page 992 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

5. The device of claim 1 wherein the instructions further include determining, by the function block, that the resource is currently available prior to establishing the A/V call.

6. The device of claim 1 wherein the instructions further include initializing the function block, by the superblock application, when the superblock application is loaded into the memory and executed.

7. The device of claim 1 wherein the request is an application programming interface (API) call from the superblock application to the function block.

8. The device of claim 1 wherein the instructions further include enabling, by the function block, a user of the device to collaborate on at least one of a document, a file, or an application with a user on another device.

9. A mobile device comprising:

a network interface;

a processor coupled to the network interface; and

a memory coupled to the processor and configured to store a plurality of instructions executable by the processor, the instructions including instructions for a superblock application having instructions for a function block included therein, wherein the function block is configured to provide a plurality of functions that are accessible to the superblock application via an application programming interface (API) of the function block, wherein the functions are provided within the superblock application itself and are accessible within the superblock application without switching context to another application on the mobile device, and wherein the superblock application cannot access at least one of the functions of the function block without providing the function block with an authorization code.

10. The mobile device of claim 9 wherein the plurality of functions includes access to an external service not present on the mobile device.

11. The mobile device of claim 10 wherein the instructions further include providing an event notification by the function block to the superblock application when the function block receives a message from the external service.

Ex.1079 / IPR2026-00210 / Page 993 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

12. The mobile device of claim 11 wherein the instructions further include receiving, by the function block, a response to the event notification from the superblock application.

13. The mobile device of claim 10 wherein the instructions further include providing, by the function block, video data to the superblock application for rendering by the superblock application, wherein the superblock application renders the video data in a video window that is superimposed on a display of the superblock application, and wherein both the video window and at least a portion of the display of the superblock application are simultaneously viewable.

14. The mobile device of claim 13 wherein the video window is associated with an audio/video (A/V) call session, and wherein the function block communicates with an external service to support the A/V call session.

15. The mobile device of claim 9 wherein the superblock application is not authorized to use at least one of the functions of the function block.

16. A method comprising:

receiving, by a function block stored in a memory of a mobile device, a request for an audio/video (A/V) call from a superblock application stored in the memory of the mobile device;

determining, by the function block, that the superblock application is authorized to access A/V call functionality provided by the function block;

determining, by the function block, that the A/V service requires access to a resource that is external to the mobile device;

establishing, by the function block, the A/V call between the superblock application and the resource via the network interface, wherein the establishing is not supported by the superblock application;

providing, by the function block, video output for the A/V call to a video window within a display window of the superblock application on the mobile device, wherein the video window is displayed simultaneously with the display window of the superblock application on a screen of the mobile device; and

providing, by the function block, audio for the A/V call via the mobile device.

Ex.1079 / IPR2026-00210 / Page 994 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

17. The method of claim 16 further comprising determining, by the function block, whether the function block has the capability to provide the A/V call.

18. The method of claim 17 further comprising determining, by the function block, whether the function block has the capability to render the A/V call.

19. The method of claim 18 further comprising determining, by the function block, whether the superblock has the capability to render the A/V call.

20. The method of claim 16 further comprising initializing the function block, by the superblock application, when the superblock application is loaded into the memory and executed.

21. The method of claim 16 wherein the request is an application programming interface (API) call from the superblock application to the function block.

22. The method of claim 16 further comprising enabling, by the function block, a user of the device to collaborate on at least one of a document, a file, or an application with a user on another device.

Ex.1079 / IPR2026-00210 / Page 995 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

ABSTRACT

An improved system and method are disclosed for improving functionality in software applications. In one example, the method includes a mobile device having a network interface, a processor, and a memory configured to store a plurality of instructions. The instructions include instructions for a superblock application having instructions for a function block included therein. The function block is configured to provide functions that are accessible to the superblock application via an application programming interface (API). The functions are provided within the superblock application itself and are accessible within the superblock application without switching context to another application on the mobile device.

Ex.1079 / IPR2026-00210 / Page 996 of 1008
Cisco Systems, Inc. v. Damaka, Inc.

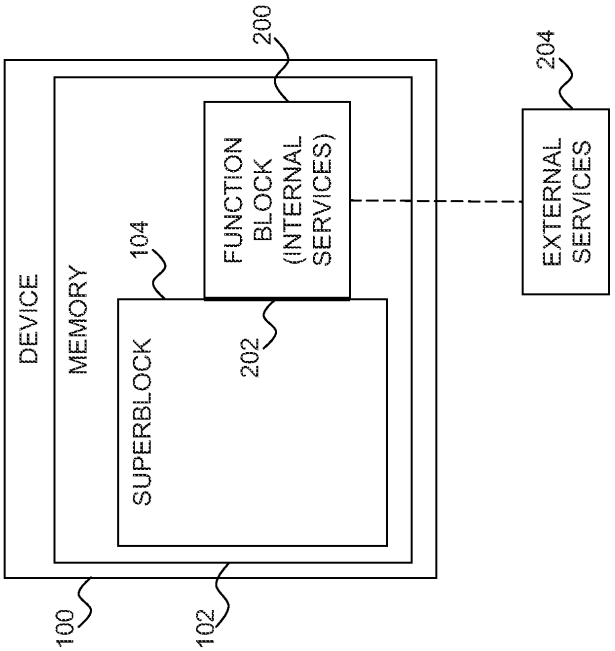

200
204
DEVICE
MEMORY
104
FUNCTION BLOCK (INTERNAL SERVICES)
EXTERNAL SERVICES
SUPERBLOCK
202
100
102

FIG. 2A

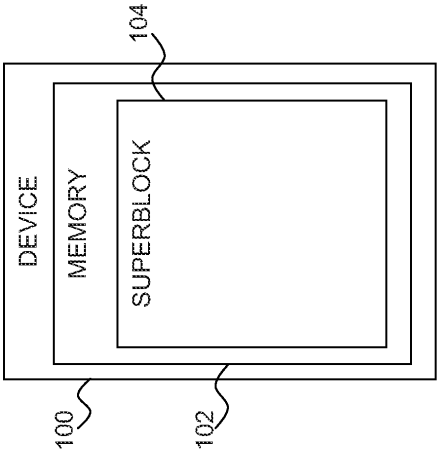

104
DEVICE
MEMORY
SUPERBLOCK
100
102

FIG. 1

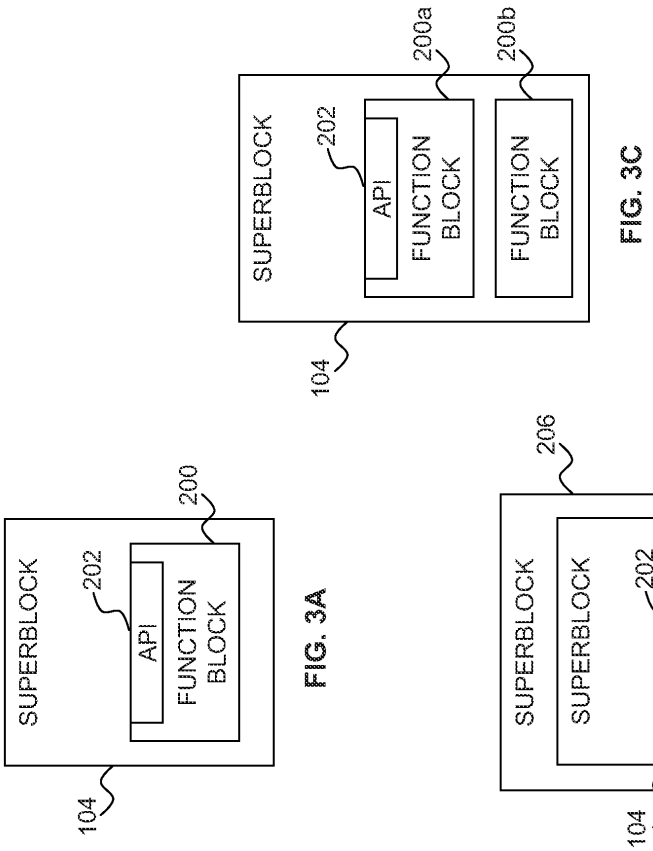


FIG. 3A

FIG. 3C

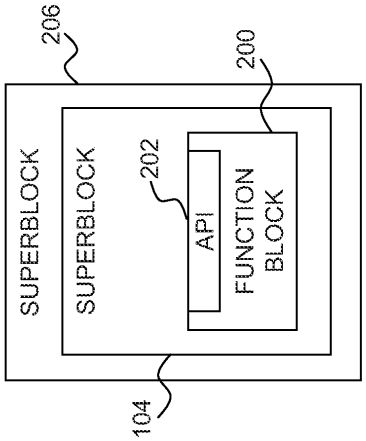


FIG. 3B

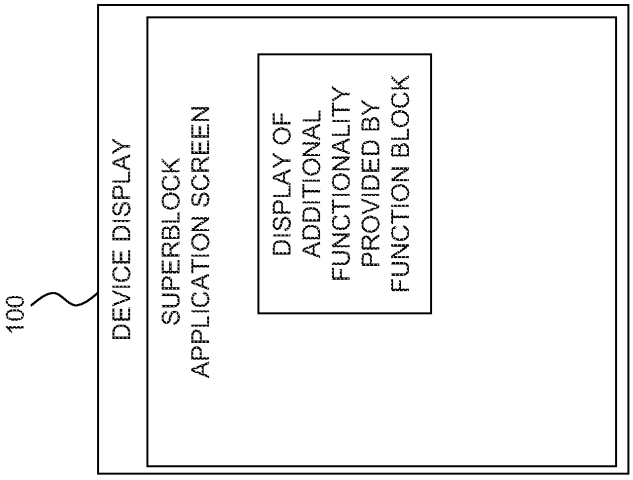


FIG. 2B

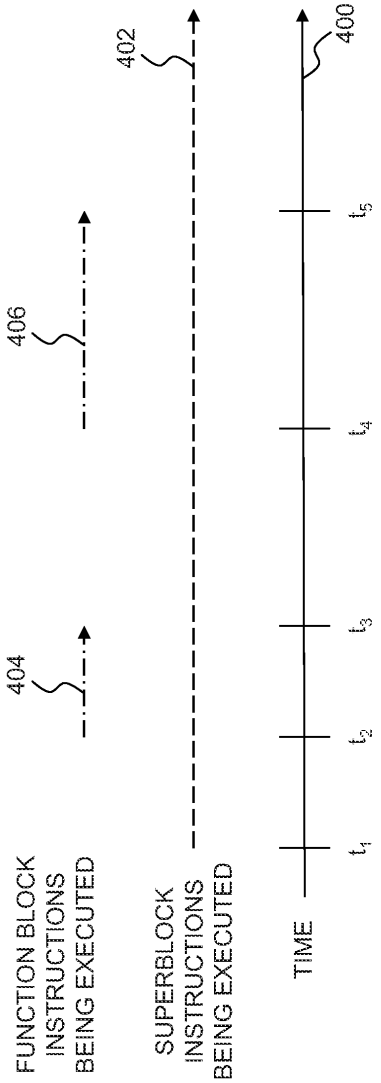

400
402
406
404
FUNCTION BLOCK INSTRUCTIONS BEING EXECUTED
SUPERBLOCK INSTRUCTIONS BEING EXECUTED
TIME
t_1
t_2
t_3
t_4
t_5

FIG. 4

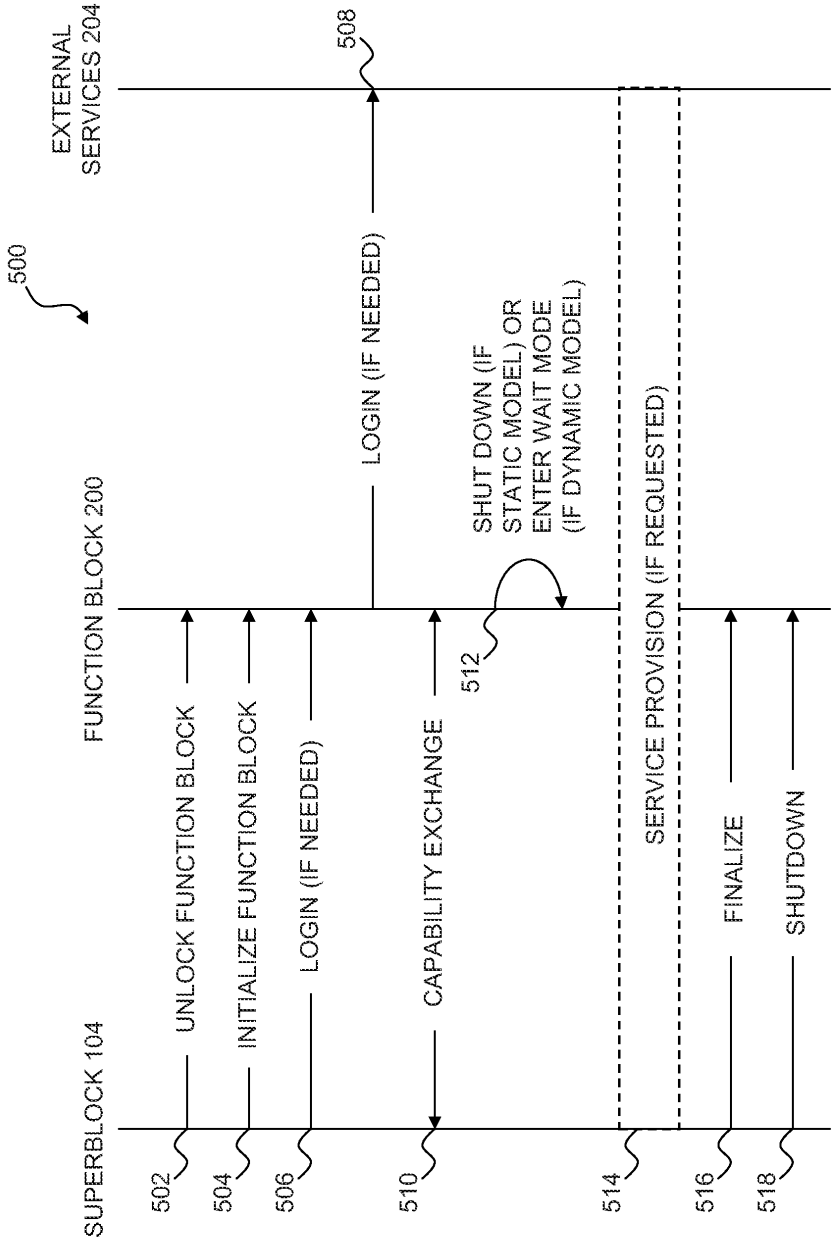

500
SUPERBLOCK 104
FUNCTION BLOCK 200
EXTERNAL SERVICES 204
UNLOCK FUNCTION BLOCK
INITIALIZE FUNCTION BLOCK
LOGIN (IF NEEDED)
CAPABILITY EXCHANGE
LOGIN (IF NEEDED)
SHUT DOWN (IF STATIC MODEL) OR ENTER WAIT MODE (IF DYNAMIC MODEL)
SERVICE PROVISION (IF REQUESTED)
FINALIZE
SHUTDOWN
502
504
506
508
510
512
514
516
518

FIG. 5

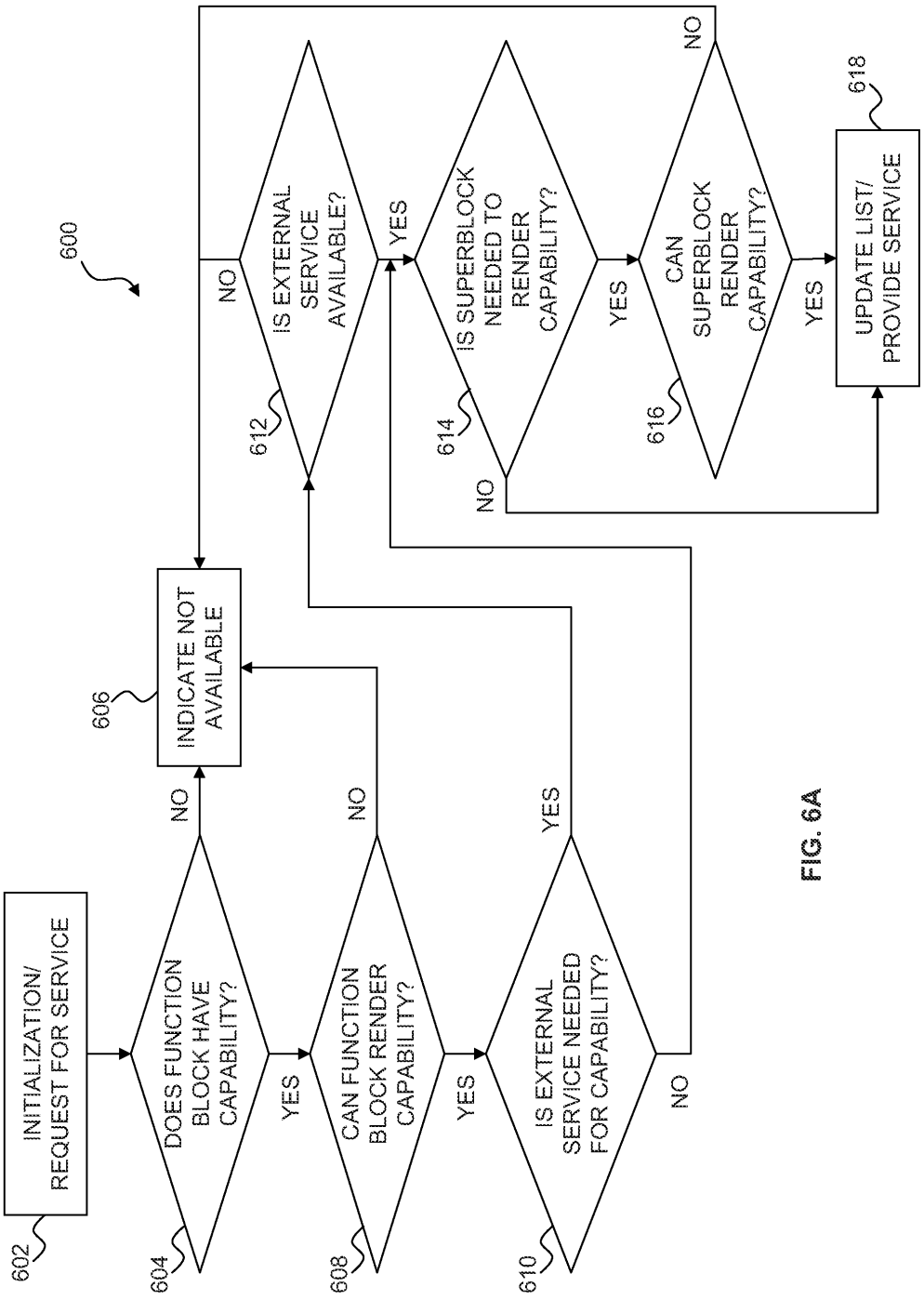

600
INITIALIZATION/ REQUEST FOR SERVICE
602
DOES FUNCTION BLOCK HAVE CAPABILITY?
604
NO
YES
CAN FUNCTION BLOCK RENDER CAPABILITY?
608
NO
YES
IS EXTERNAL SERVICE NEEDED FOR CAPABILITY?
610
YES
NO
INDICATE NOT AVAILABLE
606
IS EXTERNAL SERVICE AVAILABLE?
612
NO
YES
IS SUPERBLOCK NEEDED TO RENDER CAPABILITY?
614
YES
NO
CAN SUPERBLOCK RENDER CAPABILITY?
616
YES
NO
UPDATE LIST/ PROVIDE SERVICE
618

FIG. 6A

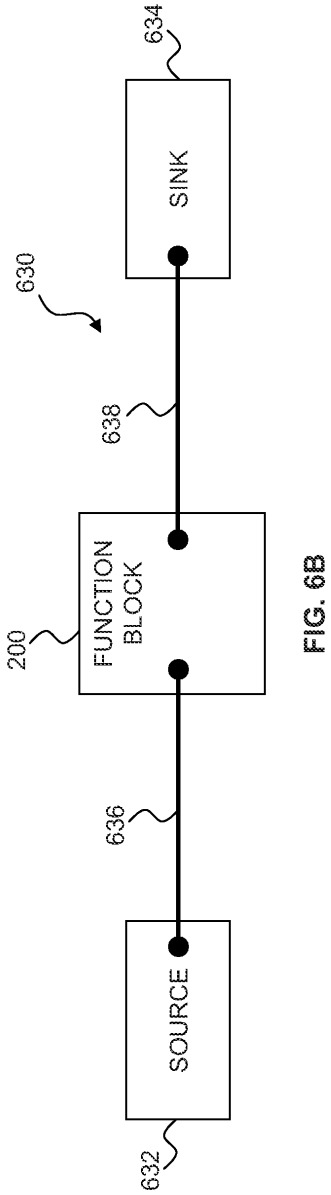

634
SINK
630
638
200
FUNCTION BLOCK
636
SOURCE
632

FIG. 6B

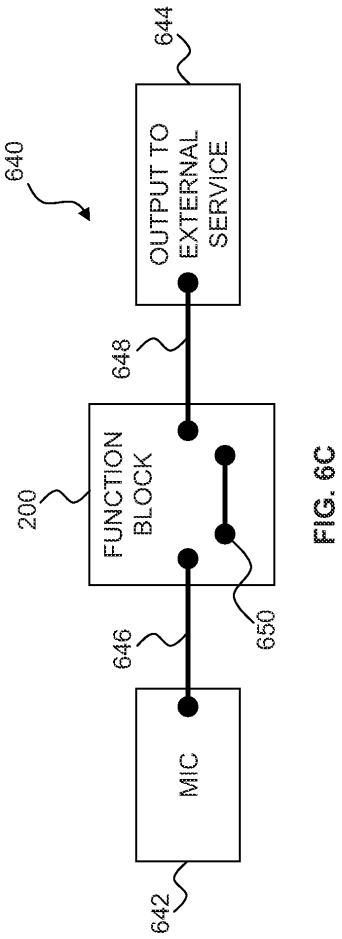

644
OUTPUT TO EXTERNAL SERVICE
640
648
200
FUNCTION BLOCK
646
650
MIC
642

FIG. 6C

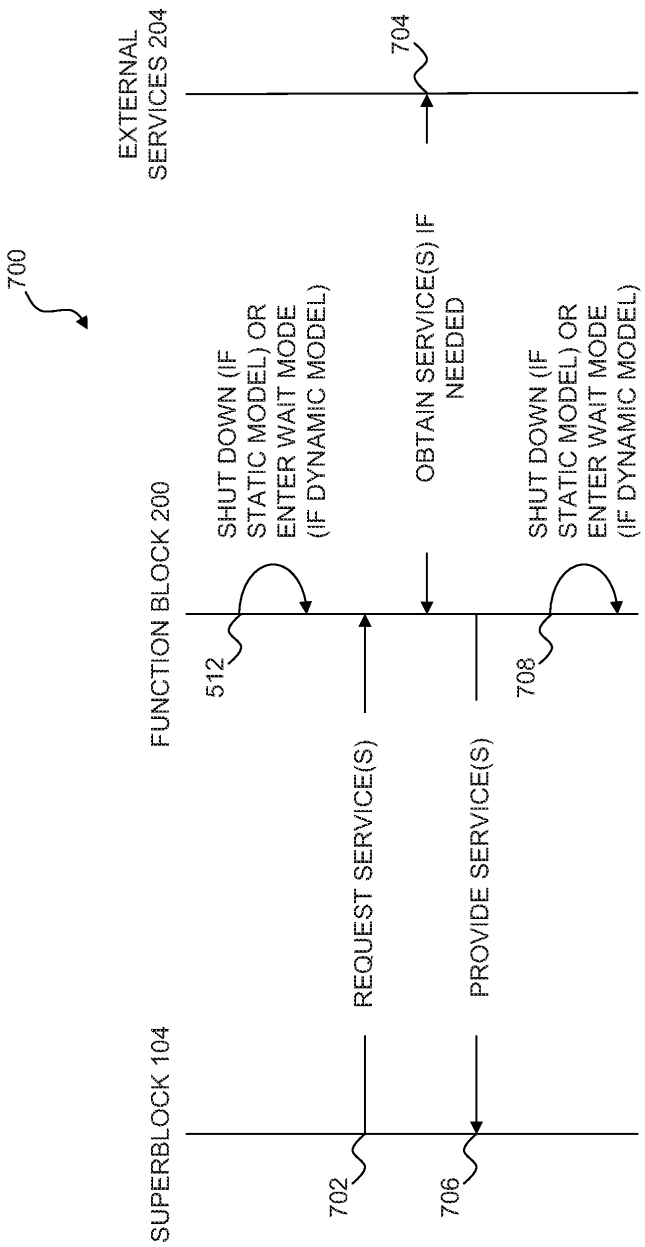

700
SUPERBLOCK 104
FUNCTION BLOCK 200
EXTERNAL SERVICES 204
REQUEST SERVICE(S)
PROVIDE SERVICE(S)
SHUT DOWN (IF STATIC MODEL) OR ENTER WAIT MODE (IF DYNAMIC MODEL)
OBTAIN SERVICE(S) IF NEEDED
SHUT DOWN (IF STATIC MODEL) OR ENTER WAIT MODE (IF DYNAMIC MODEL)
512
702
704
706
708

FIG. 7

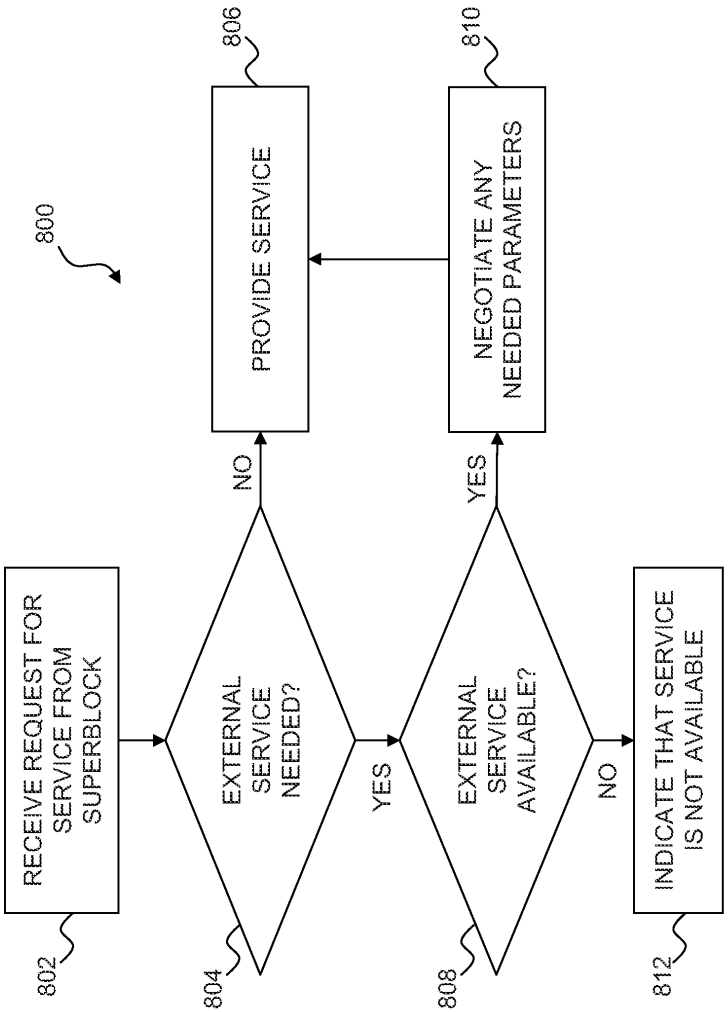

800
802
RECEIVE REQUEST FOR SERVICE FROM SUPERBLOCK
804
EXTERNAL SERVICE NEEDED?
NO
YES
806
PROVIDE SERVICE
808
EXTERNAL SERVICE AVAILABLE?
YES
NO
810
NEGOTIATE ANY NEEDED PARAMETERS
812
INDICATE THAT SERVICE IS NOT AVAILABLE

FIG. 8

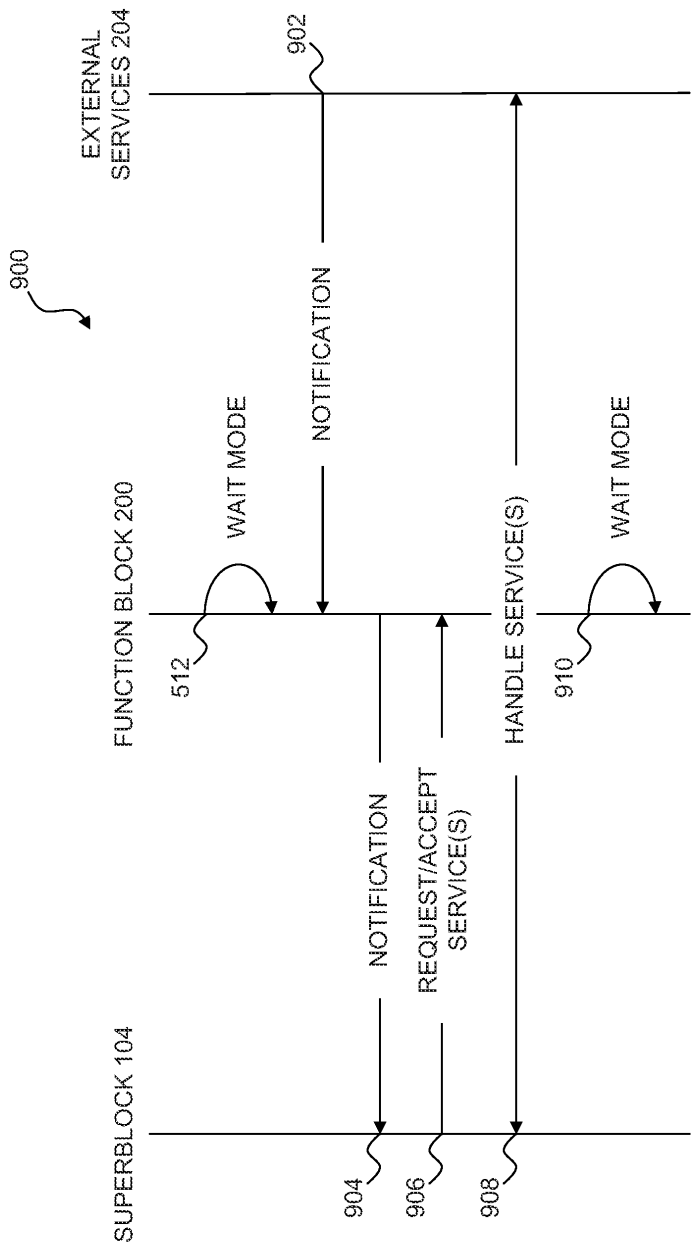

900
EXTERNAL SERVICES 204
902
FUNCTION BLOCK 200
WAIT MODE
512
NOTIFICATION
HANDLE SERVICE(S)
WAIT MODE
910
SUPERBLOCK 104
NOTIFICATION
904
REQUEST/ACCEPT SERVICE(S)
906
908

FIG. 9

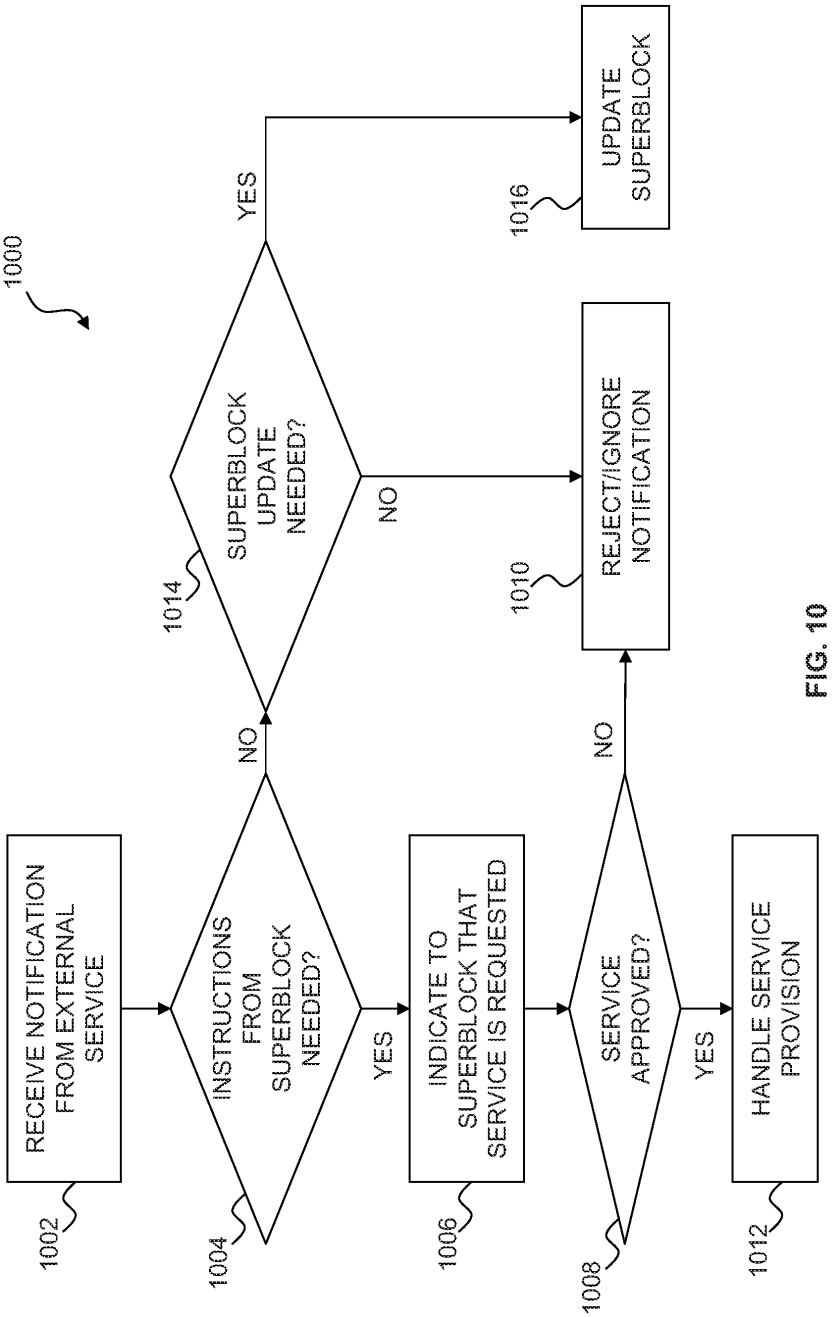

1000
RECEIVE NOTIFICATION FROM EXTERNAL SERVICE
1002
INSTRUCTIONS FROM SUPERBLOCK NEEDED?
1004
NO
YES
SUPERBLOCK UPDATE NEEDED?
1014
NO
YES
REJECT/IGNORE NOTIFICATION
1010
UPDATE SUPERBLOCK
1016
INDICATE TO SUPERBLOCK THAT SERVICE IS REQUESTED
1006
SERVICE APPROVED?
1008
NO
YES
HANDLE SERVICE PROVISION
1012

FIG. 10

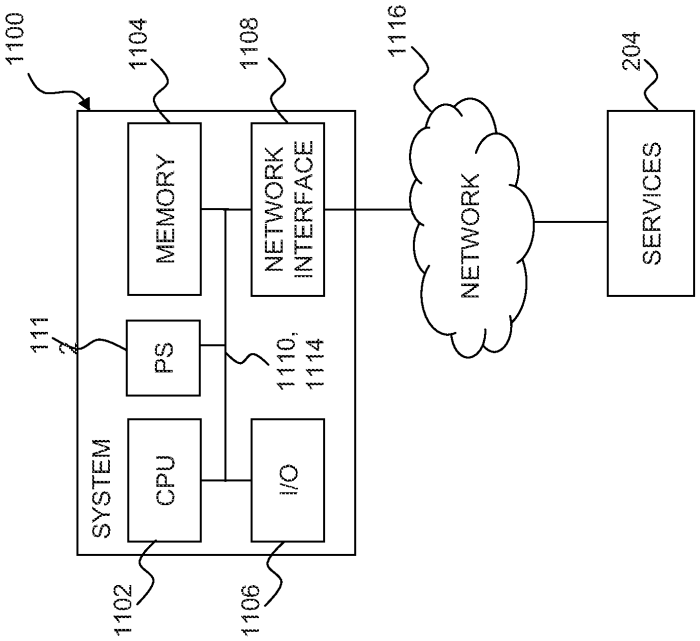

1100
1104
1108
1116
204
MEMORY
NETWORK INTERFACE
NETWORK
SERVICES
111
2
PS
1110,
1114
SYSTEM
CPU
I/O
1102
1106

FIG. 11

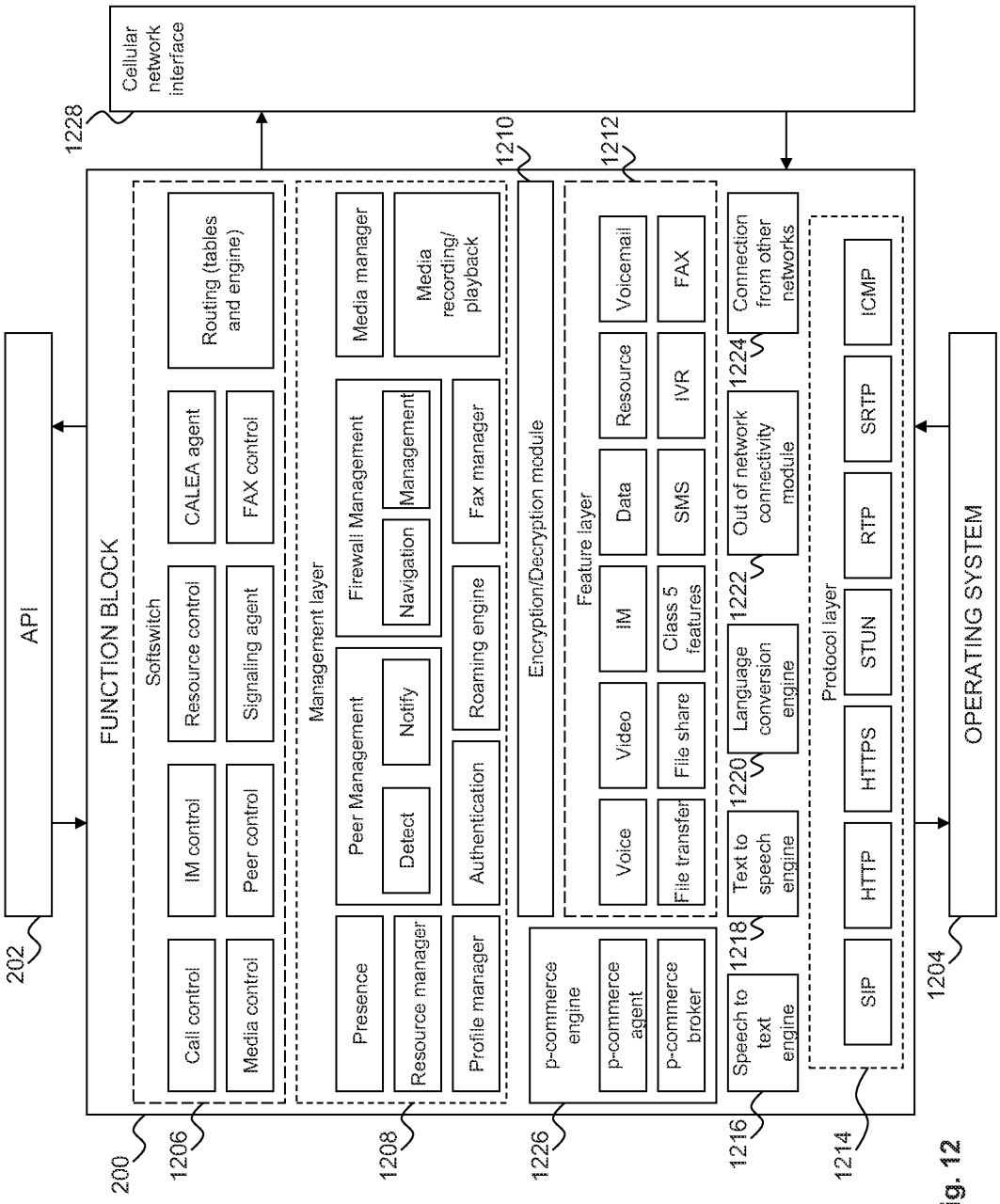

Cellular network interface
1228
1210
1212
API
202
FUNCTION BLOCK
Softswitch
Call control
Media control
IM control
Peer control
Resource control
Signaling agent
CALEA agent
FAX control
Routing (tables and engine)
Management layer
Presence
Resource manager
Peer Management
Detect
Notify
Profile manager
Authentication
Roaming engine
Firewall Management
Navigation
Management
Fax manager
Media manager
Media recording/ playback
Encryption/Decryption module
p-commerce engine
p-commerce agent
p-commerce broker
Feature layer
Voice
File transfer
Video
File share
IM
Class 5 features
Data
SMS
Resource
IVR
Voicemail
FAX
Speech to text engine
1218
Text to speech engine
1220
Language conversion engine
1222
Out of network connectivity module
1224
Connection from other networks
Protocol layer
SIP
HTTP
HTTPS
STUN
RTP
SRTP
ICMP
OPERATING SYSTEM
1204
200
1206
1208
1226
1216
1214

Fig. 12