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Roskind

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(54) **IMPLICIT ACCESS FOR COMMUNICATIONS PATHWAY**

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(58) **Field of Classification Search** 713/201, 713/170, 168, 169; 709/204
See application file for complete search history.

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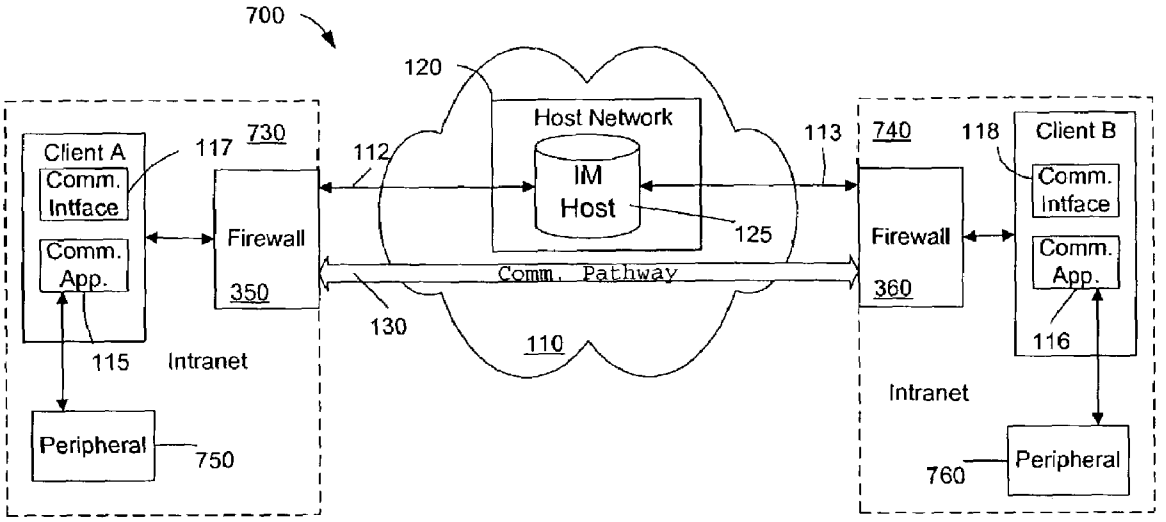
(57) **ABSTRACT**

Communication applications may include lists of users with which a user of the application communicates. If two users of a communications application each include the other user on their user lists, an implicit trust may be established between the users. For example, if user A includes user B in her list and user B includes user A in his list, then it may be determined that each user knows and/or trusts the other user. As a result, a connection or communications pathway may be automatically created between the client devices of the users to facilitate communications between the users based on the implicit trust.

60 Claims, 6 Drawing Sheets



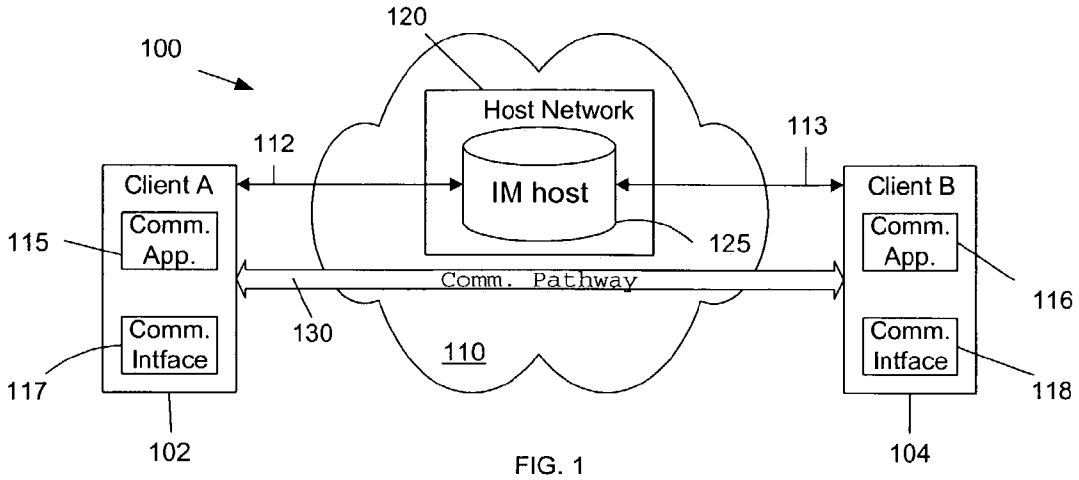

100
120
Host Network
IM host
112
113
Client A
Comm. App.
115
Comm. Intface
117
102
125
Comm. Pathway
130
110
Client B
Comm. App.
116
Comm. Intface
118
104

FIG. 1

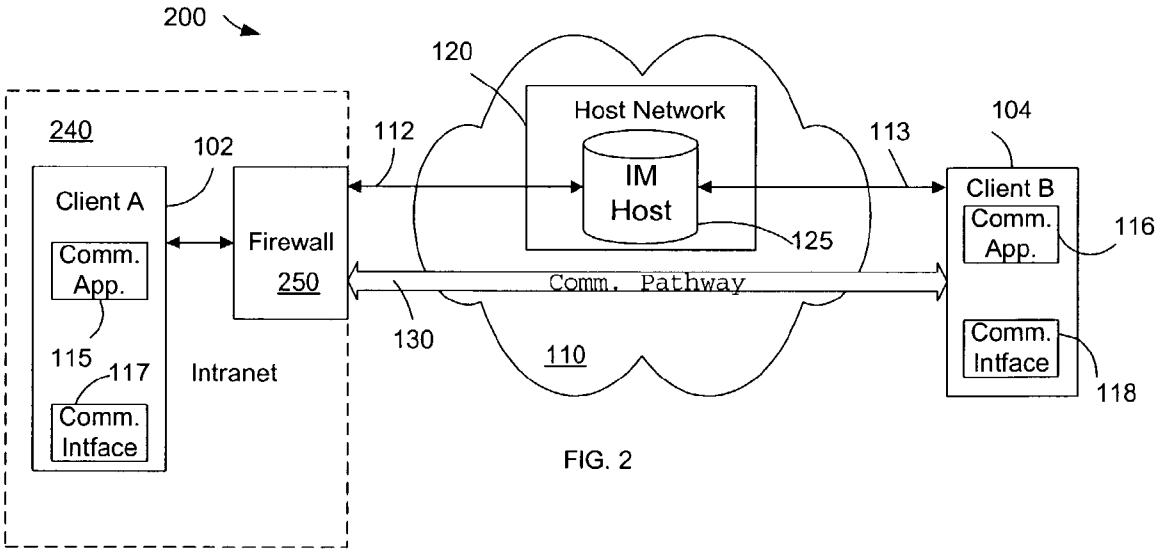

200
240
102
Client A
Comm. App.
115
117
Comm. Intface
Intranet
Firewall
250
112
120
Host Network
IM Host
125
Comm. Pathway
130
110
113
104
Client B
Comm. App.
116
Comm. Intface
118

FIG. 2

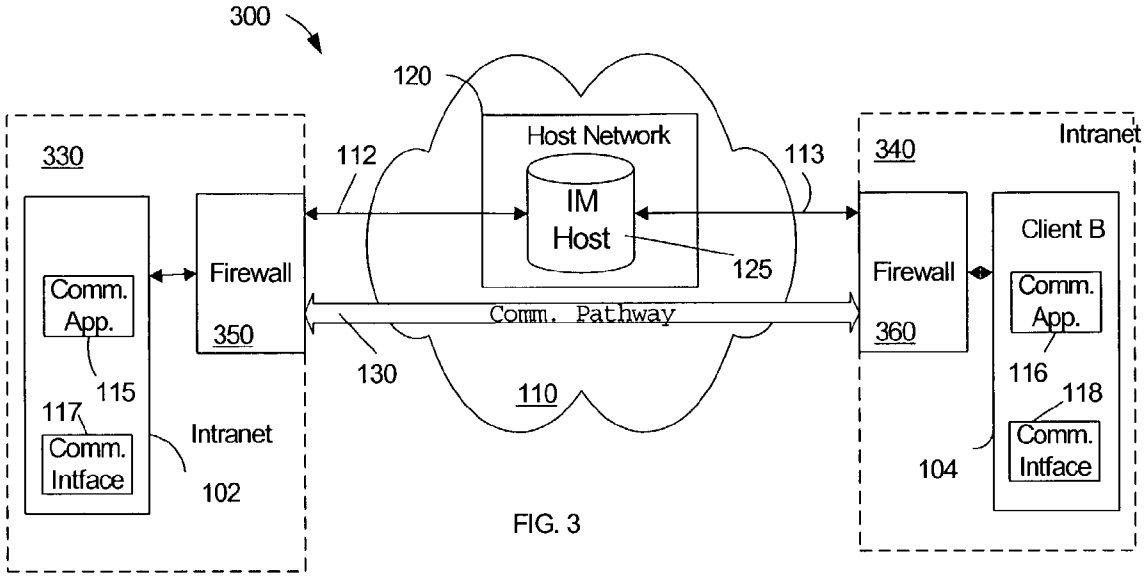

300
120
Host Network
IM
Host
125
330
112
113
340
Intranet
Firewall
350
Comm. Pathway
Firewall
360
Client B
Comm.
App.
Comm.
App.
115
116
117
118
130
110
Intranet
Comm.
Intface
Comm.
Intface
102
104

FIG. 3

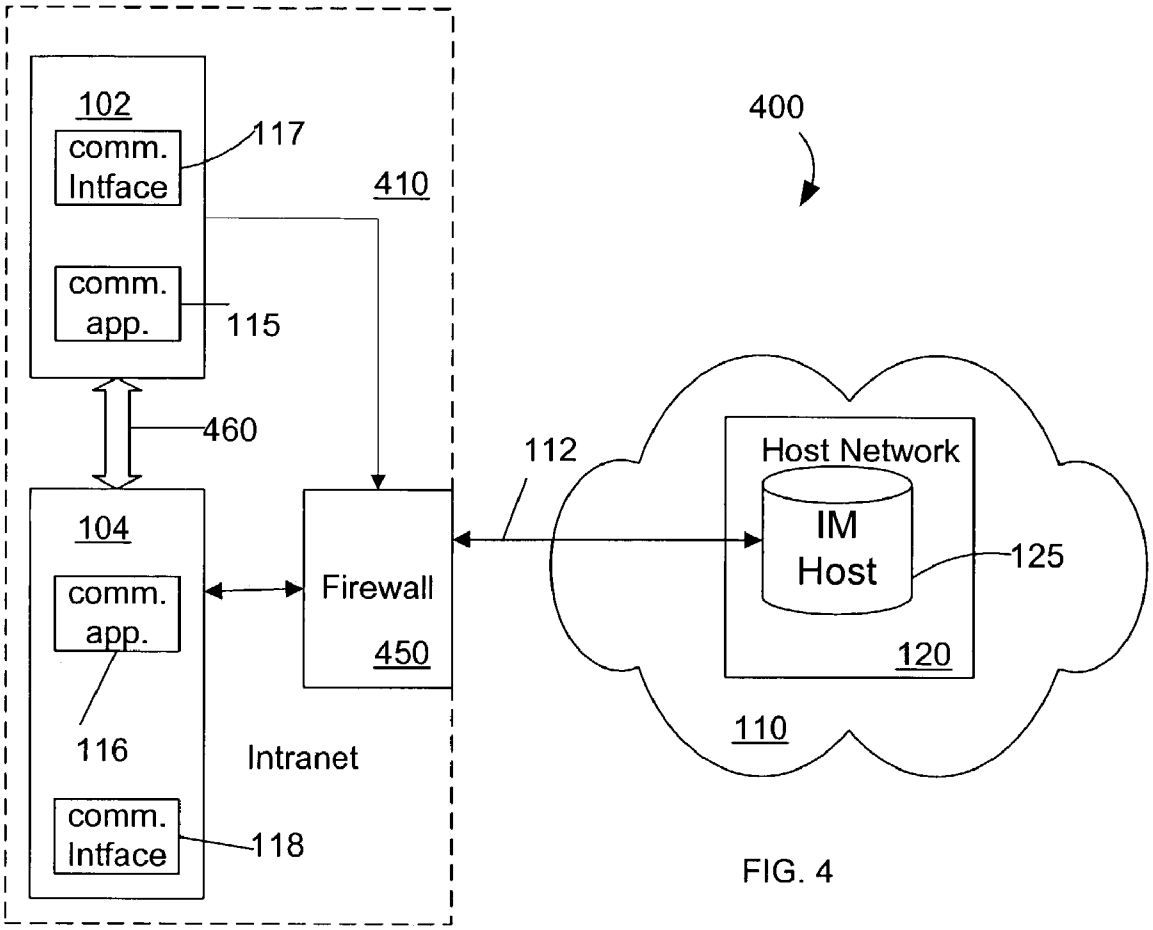

400
102
comm. Intface
117
410
comm. app.
115
460
104
comm. app.
116
comm. Intface
118
Firewall
450
Intranet
112
Host Network
IM Host
125
120
110

FIG. 4

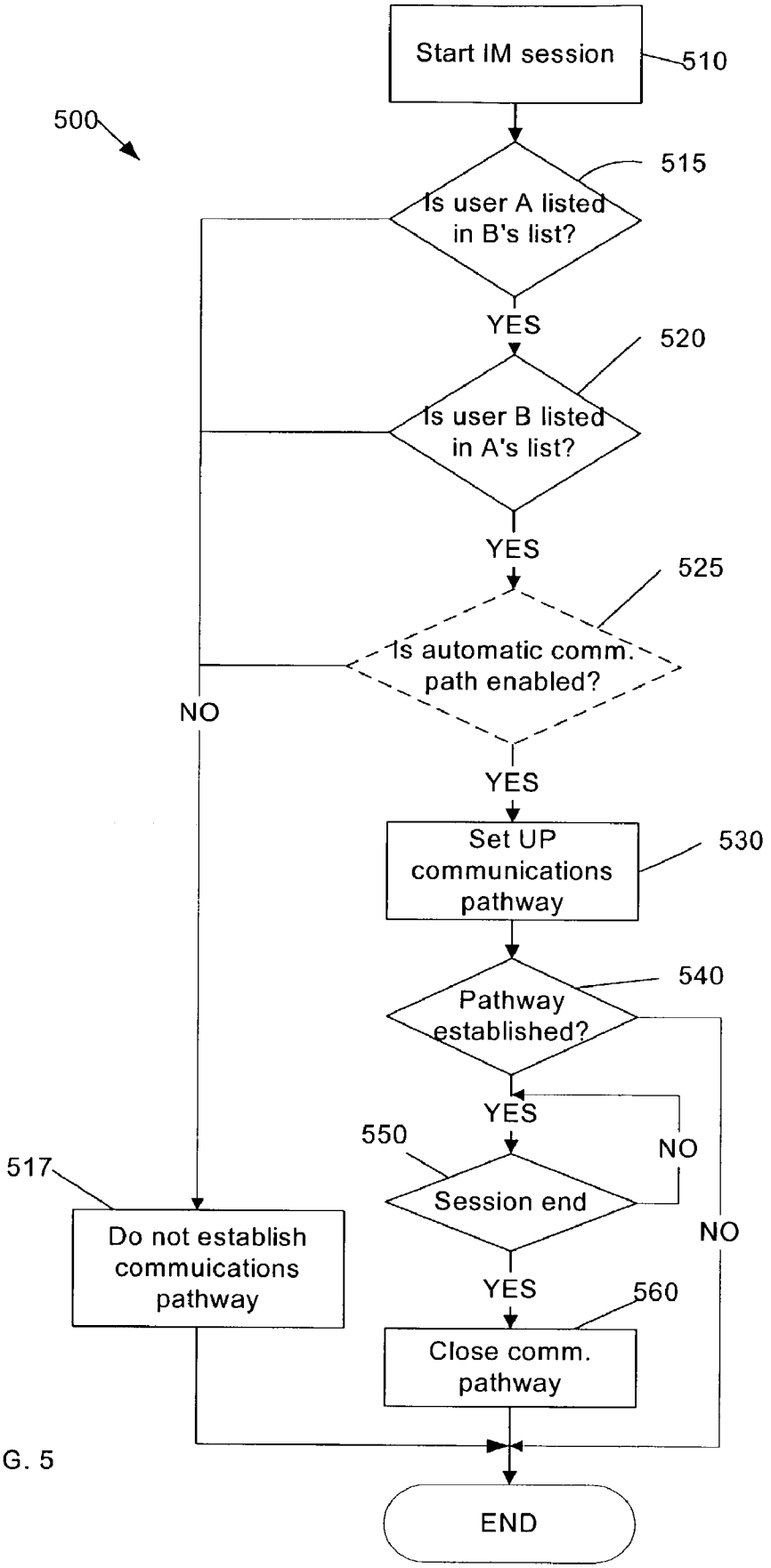

Start IM session
510
500
515
Is user A listed in B's list?
YES
520
Is user B listed in A's list?
YES
525
Is automatic comm. path enabled?
NO
YES
Set UP communications pathway
530
540
Pathway established?
YES
NO
550
Session end
517
Do not establish commuications pathway
NO
YES
560
Close comm. pathway
END

FIG. 5

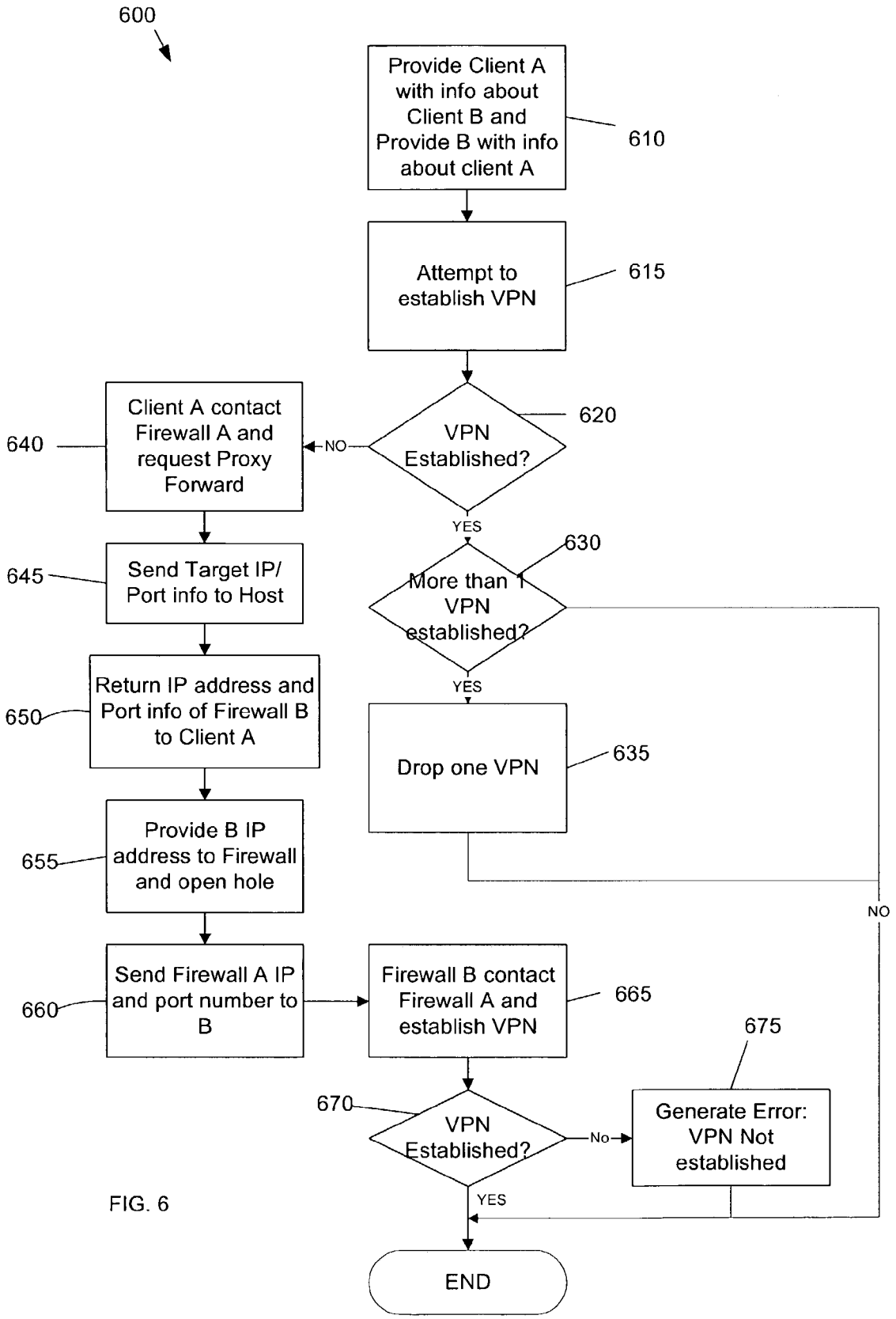

600
Provide Client A with info about Client B and Provide B with info about client A
610
Attempt to establish VPN
615
VPN Established?
620
NO
YES
Client A contact Firewall A and request Proxy Forward
640
Send Target IP/ Port info to Host
645
Return IP address and Port info of Firewall B to Client A
650
Provide B IP address to Firewall and open hole
655
Send Firewall A IP and port number to B
660
More than 1 VPN established?
630
YES
Drop one VPN
635
NO
Firewall B contact Firewall A and establish VPN
665
VPN Established?
670
No
Generate Error: VPN Not established
675
YES
END

FIG. 6

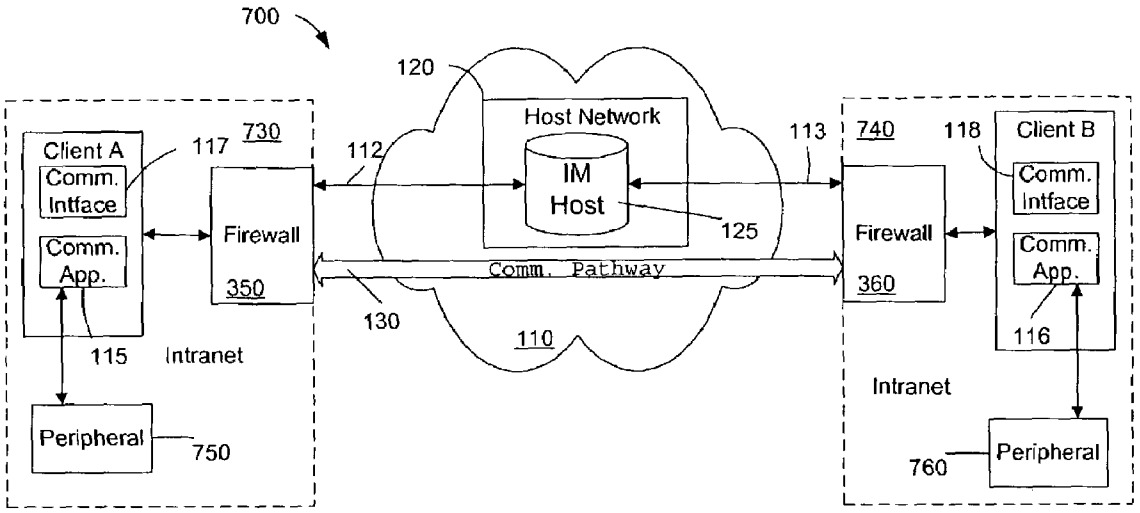

700
120
Host Network
IM
Host
125
Client A
Comm.
Intface
Comm.
App.
117
730
Firewall
350
112
113
740
118
Client B
Comm.
Intface
Comm.
App.
Firewall
360
Comm. Pathway
130
110
115
Intranet
116
Intranet
Peripheral
750
760
Peripheral

FIG. 7

IMPLICIT ACCESS FOR COMMUNICATIONS PATHWAY

TECHNICAL FIELD

The following description relates to network communications.

BACKGROUND

With the rapid proliferation and affordability of computers, the Internet has become the communications medium of choice for many users. Although the Internet is a public medium, techniques have been developed for using the Internet to enable private communications between networks. One such private communications technique is used to enable instant messaging.

Instant messaging allows users to rapidly communicate with other users of a communications network. Generally, client messaging software runs on a client A device **102***nd* provides a communications interface for entry of a message. The intended message recipient may be entered manually or may be selected from a user list, such as a Buddy List™ from America Online, Inc. Instant messaging may be used to communicate text messages, images, and sounds or voice.

SUMMARY

In one general aspect, messaging applications, systems, and methods may be used to automatically configure a communications pathway based on an implicit trust between users.

Each user of a communications application may have a user list that identifies other users to which a message may be sent. If two users of the communications application each include the other user on their user lists, an implicit trust may be inferred between the users. For example, if user A includes user B in her user list and user B includes user A in his user list, then it may be inferred or determined that each user knows and/or implicitly trusts the other user. As a result, a connection or communications pathway may be automatically created and/or configured between the client devices of the users to facilitate communications between the users based on the implicit trust.

The communications application may be an instant messaging application. The communications pathway may be implemented as a virtual private network.

In another general aspect, a communications pathway between a first client A device **102***nd* associated with the first user and a second client A device **102***nd* with the second user may be established upon determining that the first user is included on a user list associated with a communications application of the second user and that the second user is included on the user list associated with a communications application of the first user. The communications pathway may be a virtual private network.

To establish the communications pathway, an Internet protocol address of the first user may be provided to the second client device, and an Internet protocol address of the second user may be provided to the first client device. A shared secret also may be provided to the first and second client devices. The first client device may contact the Internet protocol address of the second client A device **102***nd* present the shared secret. The second client device may validate the identity of the first client B device **104** based on the presented shared secret.

In another general aspect, upon determining that an Internet protocol address (e.g., a global Internet protocol address of a firewall associated with the first client device) of a communication received from a first client device is different from the Internet protocol address (e.g., a local source Internet protocol address) of the first client device, a determination may be made that a direct communications pathway between the first client A device **102***nd* the second client device may not be established. In this case, to establish the communications pathway a hole may be opened in the firewall associated with the first client device for an Internet protocol address associated with the second client device.

To open the hole, a request for a proxy forward may be sent to the firewall. The firewall selects a target Internet protocol address and a port number. The target Internet protocol address is provided to a host (e.g., an instant messaging host) associated with the communications application. The host sends the target Internet protocol address to the second client device. The second client device responds to the host with an Internet protocol address associated with the second client device. The host provides the Internet protocol address associated with the second client device to the firewall associated with the first client device to enable the proxy forward for the Internet protocol address associated with the second client device.

The Internet protocol address associated with the second client device may be the Internet protocol address of a firewall associated with the second client device.

Other features will be apparent from the description, the drawings, and the claims.

DESCRIPTION OF DRAWINGS

FIGS. **1-4** and **7** are block diagrams of an exemplary communications system including communications pathways.

FIGS. **5** and **6** are flow charts of an exemplary process used to establish implicit communications.

Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

Some communications techniques include the use of a contact list or user list. Communications applications employing these techniques facilitate communications by allowing a user to select an intended recipient of a message from the user list. Although such applications provide a useful interface for transmitting messages, the user lists also may be helpful to facilitate other types of communications. For example, if two users include each other on their user lists, an implicit trust between the users may be inferred. Based on the implicit trust, a communications pathway may be established between the users to facilitate communications, as described in detail below.

Referring to FIG. **1**, a communications system **100** includes a client A device **102** and a client B device **104** that are associated with users A and B. Client device **102** and **104** include communication applications **115** and **116** (e.g., IM applications). When client A device **102** connects to the external network **110**, the communications application **115** may connect with the host network **120** connected to the external network **110** (e.g., by logging-on to the host network **120**) using communications link **112**. The client A device **102** also may connect to an IM host **125** that is part of the host network **120**. Similarly, when client B device **104** connects to the external network **110**, the communications

application **116** may connect with the host network **120** and the IM host **125** using communications link **113**. Once a client device **102** or **104** has connected to the IM host **120**, the communications applications **115** and **116** may send and receive messages.

If user A sends a message to user B, the IM host **125** may determine that the user list of user B or a particular portion of the user list (e.g., a group, such as buddies, family, or garners) includes user A, and that the user list (or particular portion of the user list) of user A includes user B. Based on this determination, the IM host **125** may infer that there is an implicit trust between user A and user B or that user A and user B have granted access of their client devices to each other. The IM host **125** automatically creates a communications pathway between the client devices **102** and **104** by sending a message to each of client devices **102** and **104**. Each message includes the IP address and port of the other client A device **102***nd* a shared secret.

Each client device may contact the other client device using the specified IP address and port. In addition, each client device may present the shared secret to the other client device to validate. The client devices **102** and **104** then enter negotiations to establish the details (e.g., a communications protocol and encryption) of the communications pathway **130**.

The external network **110** may be implemented using one or more local area networks (LANs), wide area networks (WANs), global networks, or any combination of these networks (e.g., the World Wide Web or the Internet). These networks may include any number of components and/or devices (e.g., hubs, routers, switches, servers, repeaters, storage devices, communications interfaces, and various communications media) and various other supporting components (e.g., software, operators/administrators/technicians, and other infrastructure).

The client devices **102** and **104** may be operated by one or more users to access the external network **110** and any associated devices and/or components. An example of a client device is a general-purpose computer capable of responding to and executing instructions in a defined manner. Client devices also may include a special-purpose computer, a personal computer ("PC"), a workstation, a server, a laptop, a Web-enabled phone, a Web-enabled personal digital assistant ("PDA"), an interactive television set, a set top box, an on-board (i.e., vehicle-mounted) computer, or a combination of one or more these devices capable of responding to and executing instructions. The client device may include any number of other devices, components, and/or peripherals, such as memory/storage devices, input devices, output devices, user interfaces, and/or communications interfaces.

The client A device **102***nd* also may include one or more software applications (e.g., an operating system, a browser application, a microbrowser application, a server application, a proxy application, a gateway application, a tunneling application, an e-mail application, an IM client application, an online service provider client application, and/or an interactive television client application) loaded on the client device to command and direct the client device. Applications include a computer program, a piece of code, an instruction, or some combination thereof, for independently or collectively instructing the client device to interact and operate as desired.

The applications may be embodied permanently or temporarily in any type of machine, device, component, physical or virtual equipment, storage medium, or propagated signal capable of providing instructions to the client device. In particular, the applications may be stored on a storage media or device (e.g., read only memory (ROM), a random access memory (RAM), a volatile/non-volatile memory, a magnetic disk, or a propagated signal or wave) readable by the client device, such that if the storage medium or device is read by the client device, the steps or instructions specified are performed.

Each of the client devices **102** and **104** also includes one or more a corresponding communications interface **117** or **118** that allow the client device to send information to and receive information from the corresponding communications links **112** or **113**.

The communications links **112** and **113** may be configured to send and receive signals (e.g., electrical, electromagnetic, or optical) that convey or carry data streams representing various types of analog and/or digital content. For example, the communications links **112** and **113** may be implemented using various communications media and one or more networks comprising one or more network devices (e.g., servers, routers, switches, hubs, repeaters, and storage devices). The one or more networks may include WANs, LANs, a plain old telephone service (POTS) network, a digital subscriber line (DSL) network, an integrated services digital network (ISDN), and a synchronous optical network (SONNET), or a combination of one or more of these networks. In addition, the communications links **112** and **113** may include one or more wireless links that transmit and receive electromagnetic signals, such as, for example, radio, infrared, and microwave signals, to convey information.

Communications applications, such as communications applications **115** and **116**, loaded and/or running on a client device may command and direct communications by the client device. The communications applications may work in conjunction with or enable the corresponding communications interface **117** or **118** to exchange data with other devices, networks, and communications media. Examples of communications applications include a browser application, a microbrowser application, a server application, a proxy application, a gateway application, a tunneling application, an e-mail application, an instant messaging (IM) application, an interactive television application, and/or an Internet service provider (ISP) application.

As described above, one example of a communications application is the IM application. The IM application may provide an IM user interface that allows a user to send and receive messages. The IM user interface may include an IM message display area including one or more windows/frames to enter and present messages. The IM user interface also may include icons, menus, and/or other inputs to control the interface, configure interface settings, and activate features of the interface.

One feature of an IM application is a list of users or contacts, such as, for example, the Buddy List™ for AOL's Instant Messenger. The user list may be populated with identifiers (e.g., screen names) of one or more users. The user identifiers that populate the user list may be divided into one or more categories of users (e.g., friends, family, coworkers, buddies, and gamers).

The user list also provides an indication of whether a user associated with an identifier is currently able to receive messages (e.g., is currently connected to the external network **110** and able to engage in a one-to-one and/or peer-to-peer communication with another client device). A user may send a message to another user by manually entering a user identifier or selecting a user identifier from the list.

When the IM application is activated and the client device is connected to the external network **110**, the IM application

causes the client device to contact the host network **120**, which is connected to the external network **110**. The host network **120** may include one or more login servers (not shown) to enable communications with and to authorize access by a client A device **102***nd* other networks to various elements of the host network **120** and/or the IM host **125**. The IM host **125** may include one or more IM servers and storage devices that manage and enable IM communications provided by the host network **120**.

To access the IM host **125** and begin an IM session, the client device **102** or **104** establishes a connection to the login server. The login server determines whether a particular user is authorized to access the IM host **125** by verifying a user identifier and/or a password. If the user is authorized to access the IM host **125**, the login server identifies a particular IM server (not shown) for use during the user's session. The client device establishes a connection to the IM host **125** and the designated server through the corresponding communications link **112** or **113**.

Once a connection to the IM server has been established, the client device may directly or indirectly transmit data to and access content from the IM server. By accessing the IM server, a user may use the IM application to view whether or not particular users are online, exchange instant messages with users, participate in group chat rooms, trade files, such as pictures, invitations, or documents, find other users with similar interests, get customized news and stock quotes, and search the World Wide Web.

The IM host **125** also may include a user profile server (not shown) connected to a database that may store user profile data. The user profile server may be used to enter, retrieve, edit, manipulate, or otherwise process user profile data. In one implementation, a user's profile data includes, for example, a user list, identified interests, a geographic location, an Internet protocol address associated with the client device, a general account, and demographic information. The user may enter, edit and/or delete profile data using an installed IM application on the client device.

Because the user data profile may be accessed by the IM host **125**, the user does not is have to reenter or update such information in the event that the user accesses the IM host **125** using a new or different client device. Accordingly, when a user accesses the IM host **125**, the IM server can instruct the user profile server to retrieve the user's profile data from the database and to provide, for example, the user list to the IM server. The user profile server also may communicate with other servers in the host network **120** to share user profile data.

The user profile data also may be saved locally on a client device. In this implementation, the client device may provide the user profile or user profile data to the host network **120** at specified times or when requested. In another implementation, the user profile may be stored locally at the client A device **102***nd* at the host network **120** and may be periodically synchronized (e.g., at login).

One communications pathway **130** that may be established between the client devices is a virtual private network (VPN). A VPN, also known as an encrypted tunnel, allows two physically separated networks or client devices to be connected over a WAN, such as the Internet, without exposing transmitted data to viewing by unauthorized parties. VPNs require at least two cooperating devices. The communication path between these devices may be viewed as a secure tunnel through the insecure external network **110**. Wrapped around the tunnel is a series of functions, which may include authentication, access control, and data encryption, that protect the transmitted data from being viewed or used by others. The VPN may be established by the IM application or other communication application working in conjunction with the communications interface **117** or **118** and/or other devices (e.g., a firewall).

In one implementation, a communications pathway **130** may be established as follows. When a first user sends an instant message to second user, the IM host **125** receives the message, and, if the second user is connected to the host network **120**, sends the message to the second user. In addition, the IM host may determine whether each user is listed in the user list of the other user (e.g., by contacting the profile server or by querying the client devices). If each user is listed in the user list of the other user, the IM host **125** may determine that permission has been granted implicitly by each user to give the other user access to their client device.

The IM host **125** may then send a message to each client device including the IP address and port of the other client A device **102***nd* a shared secret. The shared secret may include information (e.g., an identification, a key, or a certificate) that enables a client device to prove and/or authenticate the identity of a user. In another implementation, the shared secret may be provided to each client B device **104***y* a third party host (e.g., an Internet certificate site, such as Verisign) that facilitates communications.

Using the information in the message from the IM host **125**, each client device may attempt to establish a communications pathway **130**. For example, each device may contact the other client A device **102** the IP address and port specified in the message. After establishing contact with the other client device, the shared secret is presented to prove the identity of the contacting client device. Once the shared secret is verified by the other client device, the client devices may enter negotiations to establish the details of the communications pathway **130** (e.g., a communications protocol and encryption). If two communications pathways are established, one may be dropped during the negotiations.

Once the communications pathway **130** is established, the client devices may exchange data using the communications pathway **130**. Both client devices are provided with, in effect, a virtual network communication card that is able to exchange information directly with the other client device. This process is transparent to the users of the client devices.

In another implementation, a client device may send a request to the IM host **125** to establish a connection with another client device. In this case, the IM host **125** responds to the request by determining whether the implicit access has been granted between the requesting client A device **102***nd* the target client device. If so, the requesting client device is provided with the IP address and port of the target device and a shared secret. The target device also is provided with the shared secret. Establishing of the communications pathway **130** may then proceed as described above.

Either or both client devices may attempt to establish a communications pathway **130**. If both client devices attempt to establish the communications pathway **130**, only one of the attempts needs to be successful. However, if more than one communications pathway **130** is established, one of the two pathways may be dropped as part of the negotiations. Once the communications pathway **130** is established, client devices **102** and **104** may exchange data using the pathway **130**.

As shown in FIG. **2**, a communications system **200** includes client A device **102** connected to an intranet **240** or other system configuration that includes a firewall **250** (or other device, such as a server performing filtering or network address translation). The firewall **250** may enforce an access control policy between the intranet **240** and the

external network **110**, and provides at least two basic mechanisms: one to block traffic and the other to permit traffic. The firewall **250** may be implemented by one or more applications running on the client device (e.g., a personal firewall) or one or more separate devices, such as, for example, a router. The firewall **250** may provide one or more functions, such as packet filtering, network address translation (NAT), and proxy services. In addition, the firewall may provide encrypted authentication and virtual private networking, in addition to other features (e.g., content filtering and virus scanning).

If either client device **102** or **104** sends a message to the IM host **125**, the IM host **125** determines whether the user associated with each client device is included in the user list of the other user. If each user is included in the list of the other user, the IM host **125** may provide the IP address/port of each client A device **102***nd* a shared secret to the other device. Each client device **102** and **104** may attempt to establish contact with the other client device.

However, as shown in FIG. **2**, client B device **104** is not able to establish contact with client A device **102** because the IP address provided by the IM host **125** does not result in a connection. For example, if the IM host **125** provides the IP address and port number of client A device **102**, an error is generated because the IP address is a local IP address of the intranet **240** (and not understood by devices outside of the intranet **240**. If the IP address/port of the firewall **250** is provided, the firewall **250** blocks any connection attempted by client B device **104** because the firewall **250** expects a message from the IP address of the IM host **125** (which is different than that of client B device **104**).

Notwithstanding the difficulties that may be encountered establishing a connection due to the firewall associated with client A device **102**, the communications pathway **130** from client A device **102** to client B device **104** may established. For instance, client A device **102** may contact client B device **104** at the specified IP address/port and present the shared secret to client B device **104** to prove the identity of client A device **102**, which client B device **104** verifies. Then, the client devices **102** and **104** may enter negotiations to establish the details of the communications pathway **130**.

In another implementation of the communications system **200**, when an instant message is sent to either client device, the IM host **125** may determine that the IP address and port associated with client A device **102** does not match the actual IP address being used to establish communications (e.g., because firewall **250** substitutes the local IP address with a global IP address of the firewall **250**). From this information, the IM host **125** may be configured to deduce that the client A device **102** is behind a firewall (or similar device). Through a similar process, the IM host **125** may determine that the client B device **104** is not behind a firewall. In this case, if an attempt is made to establish a communications pathway **130** by either client device, the IM host **125** may send a message to the client A device **102** that provides the IP address and port of the client B device **104** and a shared secret, and also may send the shared secret to client B device **104** to facilitate communications. Client A device **102** then proceeds to contact client B device **104** and establish a communications pathway **130** as described above.

As shown in FIG. **3**, a communications system **300** includes client devices **102** and **104** that are both connected to respective intranets **330** and **340**, or otherwise behind firewalls (or other NAT devices). Client A device **102** connects to firewall **350** to access the external network **110** using communications link **112**. Similarly, client B device **104** connects to firewall **360** to access the external network **110**. Although firewalls **350** and **360** are shown as separate elements of the intranets **330** and **340**, the firewalls also may be implemented by client devices **102** and **104**.

If a message is sent by user A to user B, the IM host **125** may determine that user A is listed on the user list of user B (or a group of the list of user B), and that user B is listed on the user list of user A (or a group of the list user A). Based on this determination, the IM host **125** may infer that user A and user B have implicitly granted access to each other. If the IM host **125** attempts to give the local IP address or the global IP address of the associated firewall of either client A device **102** or **104** to the other, a communications pathway **130** may not result for the reasons explained above with regard to FIG. **2**. However, this implementation may provide a connection as follows.

First, the IM host **125** may determine that a direct connection cannot be made by the client devices. For example, the IM host **125** may determine that the global IP addresses used to establish communications with the IM host **125** do not match the local IP addresses purported to be used by the IM applications of the client devices. The IM host **125** also may determine that direct connection may not be made as a default because all other attempts to establish a communications pathway fail. In either case, the IM host **125** may inform one client device (e.g., client A device **102**) that a direct connection may not be established, whether or not it is physically impossible to achieve such a connection.

In this instance, the communications application **115** of client A device **102** may contact the firewall **350** and request that the firewall **350** open a hole. For example, the communications application **115** may request that the firewall **350** create a proxy forward to pass traffic from client B device **104** to client A device **102**. The firewall **350** randomly selects a port number and replies to the communication application **115** of client A device **102** with the selected port number and the public IP address of the firewall **350**. The selected IP address/port data effectively designate a hole in firewall **350** that may be opened to allow direct communications with client A device **102**.

The communications application **115** may provide the selected IP address/port data to the IM host **125**. The IM host **125** sends the selected IP address/port data to the communications application **116** of client B device **104** along with a shared secret. The IM host **125** also provides the IP address of firewall **360** to the communications application **115** of client A device **102** along with the shared secret. The communications application **115** passes the IP address of firewall **360** to firewall **350**. Firewall **350** opens the hole only for firewall **360** using the IP address of firewall **360**.

The communications application **116** of client B device **104** connects to the specified IP address and port of firewall **350** (through firewall **360**). As a result, the traffic from the communications application **116** arriving at the firewall **350** appears to originate from firewall **360**, and the traffic is proxied forward to the communications application **115** of client A device **102**. The communications application **115** may verify the identity of client B device **104** using the shared secret. Communications applications **115** and **116** may negotiate the details of the communications pathway **130** (e.g., a VPN) and establish the communications pathway **130**.

FIG. **4** shows a communications system **400** that includes an intranet **410** in which both client A device **102** and client B device **104** are located behind a firewall **450**. However, even though the client devices **102** and **104** are behind the firewall **450**, the local IP address and port of each client device allow direct communications between the client

devices to be established because the local IP address information is recognized by devices within the intranet **410**. In this case, a communications pathway **460** may be directly established by the client devices using the infrastructure of the intranet **410** in a manner as described with regard to FIG. **1** above.

The IM user interface may include a feature or setting to allow a user to block one or more users, a group of users, or all users on the user list from establishing a communications pathway. In addition, the IM user interface may include a setting to disable or prohibit the IM application from establishing any communications pathway regardless of whether each of two users includes the other user on their user lists. The IM user interface also may be configured to allow the communication pathway to be established for a specified group of users on the list (e.g., a user category, such as buddies, family, coworkers, and/or gamers).

FIG. **5** shows an exemplary process **500** to establish a communications pathway (e.g., a VPN). Initially, a user A starts an IM session (**510**). A determination is made as to whether user A is included in the list of user B (**515**). If not, a VPN is not established (**517**).

If user A is in the list of user B, a determination is made as to whether user B is in the list of user A (**520**). If not, a VPN is not established (**517**).

Optionally, a determination may be made whether automatic VPN connections are enabled (**525**). If not, a VPN is not established (**517**).

If user B is in the list of user A and the automatic VPN connections are enabled, then an attempt to establish a VPN (**530**) is made as described below with respect to FIG. **6**. If the VPN is established (**540**), the VPN is maintained until the IM session is over, either client device requests that the VPN be closed, or either client device disconnects from the external network (**550**). Once the IM session is finished, the VPN is closed (**560**).

FIG. **6** shows an exemplary a process **600** for setting up or establishing a communications pathway, such as a VPN. First, the IM host provides information about each client device (e.g., the client's IP address, port, and a shared secret that may be used to authenticate user/client identity) to the client devices (**610**). After receiving the information, each client may attempt to establish a VPN using the information (**615**), for example, by contacting the IP address/port provided and offering the shared secret for validation/authentication. If either client device is able to contact the other client device using the information, the VPN may be established as negotiated between the client devices.

Upon determining that a VPN was established (**620**), a determination is made as to whether more than one VPN was established (e.g., both clients were able to contact each other with the information provided and therefore established two VPNs) (**630**). If more than one VPN was established between the clients, one of the two VPNs is dropped during the negotiations (**635**).

Upon determining that a VPN was not established (**620**), one of the client devices (e.g., client A device **102**) may contact its firewall to request a proxy forward be created for the other client device (e.g., client B device **104**) (**640**). The client A device **102** receives a target public IP address and random port number selected by its associated firewall. Client device A sends the target IP/Port information to a host (**645**). The host returns the public IP address of the firewall of client B device **104** (**650**). Client device A provides the IP address to its firewall, which opens a hole in the firewall for the firewall of client B (**655**). The host sends the target IP/port information to the firewall of client B (**660**). The firewall of client B contacts firewall of client A to establish a VPN (**665**). If a VPN is not established (**670**), an error message is generated (**675**) (e.g., automatic VPN could not be configured).

As shown in FIG. **7**, a communications system **700** includes client devices **102** and **104** connected to an external network **110**. In addition, peripheral devices **750** and **760** (e.g., a gaming device, such as an X-Box™ or Playstation™) are connected to each client device **110**. The peripheral devices **750** and **760** may employ an exploring application to determine whether they are connected to any other peripheral devices. If another gaming device is detected, the gaming devices **750** and **760** may establish a connection using a data exchange protocol.

In the implementation shown in FIG. **7**, the local communications applications **115** and **116** on the client devices **102** and **104** may be programmed to mimic the data exchange protocol of the peripheral devices (e.g., to appear as peripheral devices). Client devices **102** and **104** (using the communications application on each client device) may automatically establish a communications pathway (e.g., VPN) as described above. As a result, the peripheral devices **750** and **760** may exchange data (e.g., game data that is used to play a multiplayer/device game) with the communications applications as if the communications application were another peripheral device. The communications application **115** may pass the data to the other communications application **116** using the communications pathway **130**. The other communications application **116** passes the data to its connected peripheral device **760**. As a result, an automatic (or configurable) communications link may be established between the peripheral devices (e.g., to play a game). To the peripheral devices **750** and **760**, it appears as if each device is communicating with another local peripheral device.

A number of exemplary implementations have been described. Nevertheless, it is understood that various modifications may be made. For example, suitable results may be achieved if the steps of the disclosed techniques are performed in a different order and/or if components in a disclosed architecture, device, or circuit are combined in a different manner and/or replaced or supplemented by other components. Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A method comprising:

determining whether a first user is included on a user list associated with an instant messaging application of a second user;

determining whether the second user is included on a user list of an instant messaging application associated with the first user; and

regulating a communications pathway between a first client device associated with the first user and a second client device associated with the second user based on both the determination of whether the first user is included on a user list associated with an instant messaging application of the second user and the determination of whether the second user is included on a user list of instant messaging application associated with the first user.

2. The method of claim **1** wherein regulating the communications pathway includes establishing a virtual private network.

3. The method of claim **1** wherein determining whether the first and second users are included on user lists includes accessing the instant messaging application.

4. The method of claim 1 wherein regulating the communications pathway includes providing an Internet protocol address of the first client device to the second client device.

5. The method of claim 4 wherein regulating the communications pathway includes providing an Internet protocol address of the second client device to the first client device.

6. The method of claim 5 wherein regulating the communications pathway includes:

providing a shared secret to the first and second client devices,

sending a communication to the Internet protocol address of the second client device, the communication including the shared secret, and

validating the identity of the first client device based on the shared secret included in the communication.

7. The method of claim 1 further comprising sending an initial message from the first client device to the second client device, wherein regulating the communications pathway includes determining that a source Internet protocol address for the message received from the first client device is different from the Internet protocol address of the first client device.

8. The method of claim 7 further comprising determining that the source Internet protocol address of the message received from the first client device is a global Internet protocol address, and the Internet protocol address of the first client device is a local Internet protocol address.

9. The method of claim 7 wherein regulating the communications pathway includes providing the Internet protocol address of the second client device to the first client device, providing a shared secret to the first and second client devices, sending a communication including the shared secret to the Internet protocol address of the second client device, and validating the identity of the first client device using the shared secret.

10. The method of claim 1 wherein regulating the communications pathway includes establishing a hole in a firewall associated with the first client device for an Internet protocol address associated with the second client device.

11. The method of claim 10 further comprising determining that a direct communications pathway between the first client device and the second client device may not be established.

12. The method of claim 10 wherein establishing the hole includes:

requesting creation of a proxy forward,

selecting a port number of the firewall,

providing the port number and Internet protocol address of the firewall to the second client device, and

establishing the proxy forward for the Internet protocol address associated with the second client device.

13. The method of claim 12 wherein regulating the communications pathway further includes:

providing a shared secret to the first and second client devices,

contacting by the second client device the Internet protocol address associated with the firewall,

presenting the shared secret,

validating the identity of the second client device using the shared secret, and

establishing the communications pathway.

14. The method of claim 13 wherein requesting the proxy forward includes:

selecting a target Internet protocol address and a port number of the firewall associated with the first client device,

providing the target Internet protocol address to a host,

sending the target Internet protocol address from the host to the second client device,

sending an Internet protocol address associated with the second client device to the host,

providing the Internet protocol address associated with the second client device to the firewall associated with the first client device, and

enabling the proxy forward for the Internet protocol address associated with the second client device.

15. The method of claim 14 wherein providing the Internet protocol address associated with the second client device includes providing the Internet protocol address of a firewall associated with the second client device.

16. The method of claim 15 wherein regulating the communications pathway includes receiving a contact from the firewall associated with the second client device at the target Internet protocol address and port number of the firewall associated with the first client device.

17. The method of claim 1 further comprising receiving a request from the communications program of the first user to establish a communications pathway with the communications program of the second user, wherein:

determining whether a first user is included on a user list associated with an instant messaging application of a second user comprises determining whether a first user is included on a user list associated with an instant messaging application of a second user in response to receiving the request;

determining whether the second user is included on a user list of an instant messaging application associated with the first user comprises determining whether the second user is included on a user list of an instant messaging application associated with the first user in response to receiving the request; and

regulating the communications pathway comprises establishing the communications pathway between the first client device and the second client device.

18. The method of claim 1 further comprising receiving a message from the instant messaging application of the first user directed to the instant messaging application of the second user, wherein:

determining whether a first user is included on a user list associated with an instant messaging application of a second user comprises determining whether a first user is included on a user list associated with an instant messaging application of a second user in response to receiving the message;

determining whether the second user is included on a user list of an instant messaging application associated with the first user comprises determining whether the second user is included on a user list of an instant messaging application associated with the first user in response to receiving the message; and

regulating the communications pathway comprises establishing the communications pathway between the first client device and the second client device.

19. The method of claim 1 wherein regulating the communications pathway includes establishing a peer-to-peer connection between the first client device and the second client device.

20. A communications system comprising:

a first client device associated with a first user and including an instant messaging application;

a second client device associated with a second user and including an instant messaging application; and

a host to determine whether the first user is included on a user list of the instant messaging application of the second client device, and to determine whether the second user is included on a user list of the instant messaging application of the first client device, and to regulate a communications pathway between the first client device and the second client device based on both the determination of whether the first user is included on a user list of the instant messaging application of the second client device and the determination of whether the second user is included on a user list of the instant messaging application of the first device.

21. The system of claim **20** wherein the communications pathway comprises a virtual private network.

22. The system of claim **21** wherein the host is configured to provide an Internet protocol address of the first client device to the second client device.

23. The system of claim **22** wherein the host is configured to provide an Internet protocol address of the second client device to the first client device.

24. The system of claim **23** wherein the host is configured to provide a shared secret to the first and second client devices, the first client device is configured to contact the Internet protocol address of the second client device and present the shared secret, and the second client device is configured to validate the identity of the first client device based on the shared secret.

25. The system of claim **20** wherein the first client device is configured to send a message to the second client device using the instant messaging application and the host is configured to receive the message and to determine that the Internet protocol address of the message is different from the Internet protocol address of the first client device.

26. The system of claim **25** wherein Internet protocol address of the message is a global Internet protocol address and the Internet protocol address of the first client device is a local Internet protocol address.

27. The system of claim **25** wherein the host is configured to provide the Internet protocol address of the second client device to the first client device and to provide a shared secret to the first and second client devices, the first client device is configured to contact the Internet protocol address of the second client device and present the shared secret, and the second client device is configured to validate the identity of the first user device.

28. The system of claim **20** wherein the host is configured to determine a direct communications pathway between the first client device and the second client device may not be established.

29. The system of claim **28** wherein the first client device is configured to request creation of a hole in a firewall associated with the first device for an Internet protocol address associated with the second device.

30. The system of claim **29** wherein the first device is configured to receive a proxy forward from the firewall in response to the request and a port number and Internet protocol address of the firewall.

31. The system of claim **30** wherein the proxy forward is created for the Internet protocol address associated with the second device.

32. The system of claim **30** wherein the second client device is configured to contact the Internet protocol address associated with the firewall and to present the shared secret, and the first client device is configured to validate the identity of the second client device and to negotiate details of the communications pathway with the second client device.

33. The system of claim **29** wherein the first client device is configured to receive a target Internet protocol address and a port number in response to the request from the firewall, the first client device is configured to provide the target Internet protocol address to the host, the host is configured to provide the target Internet protocol address to the second client device, the second client devices is configured to send an IP address associated with the second client device to the host, the host is configured to provide the Internet protocol address associated with the second IP device to the firewall, and the first client device is configured to receive the proxy forward for the Internet protocol address associated with the second client device.

34. The system of claim **33** wherein the Internet protocol address associated with the second device is an IP address of a firewall associated with the second client device.

35. The system of claim **34** wherein the second client device is configured through its associated firewall to contact the firewall associated with the first client device at the target Internet protocol address and port number to establish the communications pathway.

36. The system of claim **20** wherein the host is configured to:

receive a request from the instant messaging application of the first client device to establish a communications pathway with the instant messaging application of the second client device;

determine whether a first user is included on a user list associated with an instant messaging application of a second user in response to receiving the request;

determine whether the second user is included on a user list of an instant messaging application associated with the first user in response to receiving the request; and

to regulate the communications pathway by establishing the communications pathway between the first client device and the second client device.

37. The system of claim **20** wherein the host is configured:

receive a message from the instant messaging application of the first client device directed to the instant messaging application of the second client device;

determine whether a first user is included on a user list associated with an instant messaging application of a second user in response to receiving the request;

determine whether the second user is included on a user list of an instant messaging application associated with the first user in response to receiving the request; and

to regulate the communications pathway by establishing the communications pathway between the first client device and the second client device.

38. The system of claim **20** wherein the first client device include an interface to receive gaming device signals, the second client device includes an interface to receive gaming device signals, and the communications pathway is configured to exchange the gaming device signals.

39. The system of claim **20** wherein, to regulate the communications pathway, the host is configured to establish a peer-to-peer connection between the first client device and the second client device.

40. A host system comprising:

an interface to receive a communication from a first client device associated with a first user and to transmit a communication to a second client device associated with a second user;

storage to store a user list associated with an instant messaging application of the first user and to store a user list associated with an instant messaging application of the second user; and

a host to determine an identifier of the first user and an identifier of the second user associated with a received message, to determine whether the first user list includes the second user identifier, to determine whether the second user list includes the first user identifier, and to regulate a communications pathway between the first and second client devices based on both the determination of whether the first user list includes the second user identifier and the determination of whether the second user list includes the first user identifier.

41. The system of claim **40** wherein the communications pathway is a virtual private network.

42. The system of claim **40** wherein the host is configured to provide an Internet protocol address of the first client device to the second client device.

43. The system of claim **42** wherein the host is configured to provide an Internet protocol address of the second client device to the first client device.

44. The system of claim **43** wherein the host is configured to provide a shared secret to the first and second client devices to provide for validation of the identities of the first and second client devices.

45. The system of claim **40** wherein the host is configured to determine that the Internet protocol address of the message is different from the Internet protocol address of the first client device.

46. The system of claim **45** wherein the Internet protocol address of the message is a global Internet protocol address and the Internet protocol address of the first client device is a local Internet protocol address.

47. The system of claim **46** wherein the host is configured to determine a direct communications pathway between fist client device and the second client device may not be established.

48. The system of claim **47** wherein the host is configured to receive a communication from the first client device including a target Internet protocol address and a port number of a firewall associated with the first client device, to provide the target Internet protocol address to the second client device, to receive an Internet protocol address associated with the second client device, and provide the second user Internet protocol address to the first client device to enable creation of a proxy forward to first client device for the second client device Internet protocol address.

49. The system of claim **48** wherein the second client device Internet protocol address is an Internet protocol address of a firewall associated with the second client device.

50. The system of claim **40** wherein the identifiers of the first and second users are screen names.

51. The system of claim **40** wherein the host is configured to provide the Internet protocol address of the second client device to the first client device and to provide a shared secret to the first and second client devices to facilitate establishing the communications pathway.

52. The system of claim **40** wherein the host is configured to determine a direct communications pathway between first client device and the second client device may not be established.

53. The system of claim **52** wherein the host is configured to receive a communication from the first client device including a target Internet protocol address and a port number of a firewall associated with the first client device, to provide the target Internet protocol address to the second client device, to receive an Internet protocol address associated with the second client device, and to provide the second client device Internet protocol address to the first client device to enable creation of a proxy forward to first client device for the second client device Internet protocol address.

54. The system of claim **53** wherein the second client device Internet protocol address is an Internet protocol address of a firewall associated with the second client device.

55. The system of claim **40** wherein, to regulate the communications pathway, the host is configured to establish a peer-to-peer connection between the first client device and the second client device.

56. A method comprising:

determining whether a first user is included on a user list associated with an instant messaging application of a second user;

determining whether the second user is included on a user list of an instant messaging application associated with the first user; and

inferring an implicit trust between the first user and the second user based on both the determination of whether the first user is included on a user list associated with an instant messaging application of the second user and the determination of whether the second user is included on a user list of an instant messaging application associated with the first user.

57. The method of claim **56** further comprising: regulating communications between the first user and the second user based on the inferred implicit trust.

58. A system comprising:

means for determining whether a first user is included on a user list associated with an instant messaging application of a second user;

means for determining whether the second user is included on a user list of an instant messaging application associated with the first user; and

means for regulating a communications pathway between a first client device associated with the first user and a second client device associated with the second user based on both the determination of whether the first user is included on a user list associated with an instant messaging application of the second user and the determination of whether the second user is included on a user list of an instant messaging application associated with the first user.

59. A communications system comprising:

a first client device associated with a first user and including an instant messaging application;

a second client device associated with a second user and including an instant messaging application; and

a host to determine whether the first user is included on a user list of the instant messaging application of the second client device, and to determine whether the second user is included on a user list of the instant messaging application of the first client device, and to infer an implicit trust between the first user and the

second user based on both the determination of whether the first user is included on a user list associated with an instant messaging application of the second user and the determination of whether the second user is included on a user list of an instant messaging application associated with the first user.

60. A host system comprising:

an interface to receive a communication from a first client device associated with a first user and to transmit a communication to a second client device associated with a second user;

storage to store a user list associated with an instant messaging application of the first user and to store a user list associated with an instant messaging application of the second user; and

a host to determine an identifier of the first user and an identifier of the second user associated with a received message, to determine whether the first user list includes the second user identifier, to determine whether the second user list includes the first user identifier, and to infer an implicit trust between the first user and the second user based on both the determination of whether the first user is included on a user list associated with an instant messaging application of the second user and the determination of whether the second user is included on a user list of an instant messaging application associated with the first user.

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