US008924217B2

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Moore et al.

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(45) **Date of Patent: Dec. 30, 2014**

(54) **COMMUNICATION CONVERTER FOR CONVERTING AUDIO INFORMATION/TEXTUAL INFORMATION TO CORRESPONDING TEXTUAL INFORMATION/AUDIO INFORMATION**

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(73) Assignee: **Verizon Patent and Licensing Inc.**, Basking Ridge, NJ (US)

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G10L 15/00 (2013.01)
(Continued)

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(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

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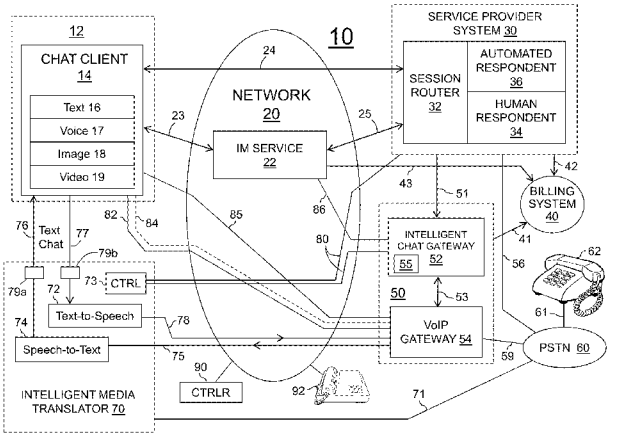
Primary Examiner — Brian Albertalli

(57) **ABSTRACT**

A communication converter is described for converting among speech signals and textual information, permitting communication between telephone users and textual instant communications users.

20 Claims, 11 Drawing Sheets



(51) **Int. Cl.**

G10L 13/00	(2006.01)
H04M 1/64	(2006.01)
H04M 15/00	(2006.01)
G06Q 20/08	(2012.01)
G10L 13/04	(2013.01)
G10L 15/26	(2006.01)
H04L 12/14	(2006.01)
H04L 12/18	(2006.01)
H04L 12/58	(2006.01)
H04L 29/06	(2006.01)
H04L 12/725	(2013.01)
H04M 3/42	(2006.01)
H04M 3/46	(2006.01)
H04M 3/53	(2006.01)
H04M 7/00	(2006.01)
H04M 15/08	(2006.01)
H04M 17/00	(2006.01)
H04L 29/08	(2006.01)
H04M 3/493	(2006.01)
H04M 3/533	(2006.01)
H04M 7/12	(2006.01)

(52) **U.S. Cl.**

CPC ***H04M 15/09*** (2013.01); ***H04M 15/51*** (2013.01); ***H04M 15/55*** (2013.01); ***H04M 15/56*** (2013.01); ***H04M 15/57*** (2013.01); ***H04M 15/63*** (2013.01); ***H04M 15/77*** (2013.01); ***H04M 15/772*** (2013.01); ***H04M 15/8292*** (2013.01); ***H04M 15/83*** (2013.01); ***H04M 17/00*** (2013.01); ***H04L 65/1006*** (2013.01); ***H04L 65/1069*** (2013.01); ***H04L 65/80*** (2013.01); ***H04L 65/4007*** (2013.01); ***H04L 67/24*** (2013.01); ***H04L 67/14*** (2013.01); ***H04L 69/329*** (2013.01); *H04L 12/1827* (2013.01); *H04L 12/5835* (2013.01); *H04L 51/066* (2013.01); *H04M 3/4931* (2013.01); *H04M 3/533* (2013.01); *H04M 3/53308* (2013.01); *H04M 7/12* (2013.01); *H04M 2201/60* (2013.01); *H04M 2203/2066* (2013.01); *H04M 2203/4509* (2013.01); *H04M 2203/4536* (2013.01); *H04M 2215/202* (2013.01); *H04M 2215/208* (2013.01); *H04M 2215/44* (2013.01); *H04M 2215/54* (2013.01); *H04M 2215/62* (2013.01); *H04M 2215/64* (2013.01); *H04M 2215/66* (2013.01); *H04M 2215/725* (2013.01); *H04M 2215/7254* (2013.01); *H04M 2215/7263* (2013.01); *H04M 2215/82* (2013.01); *H04M 2242/30* (2013.01); *H04L 65/1016* (2013.01); *H04L 69/08* (2013.01)

USPC **704/270.1**; 704/231; 704/258; 379/88.01

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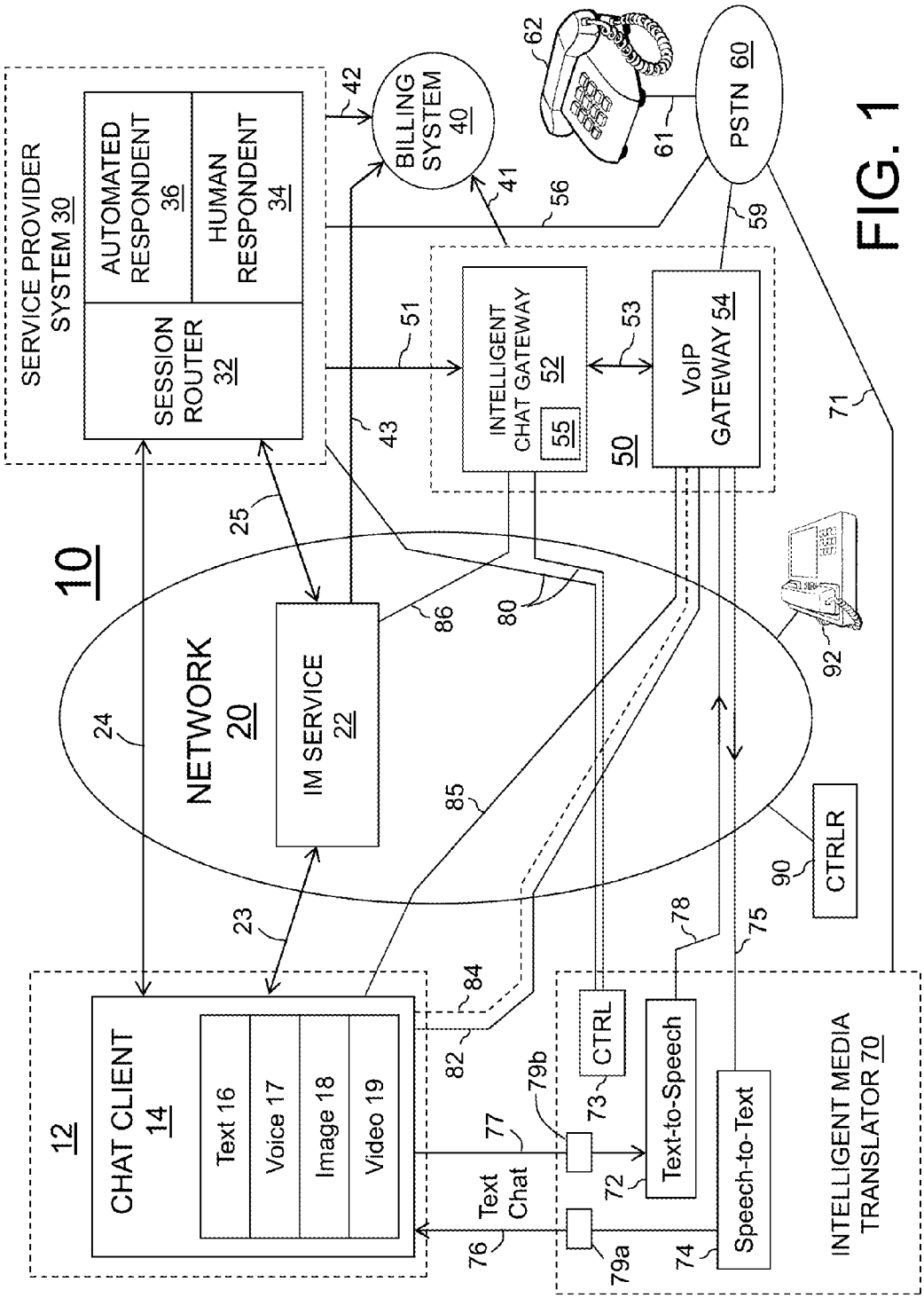
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SESSION ROUTER 32
BILLING SYSTEM 40
PSTN 60
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55
50
VoIP GATEWAY 54
IM SERVICE 22
CHAT CLIENT 14
Text 16
Voice 17
Image 18
Video 19
12
CTRL
Text-to-Speech
Speech-to-Text
INTELLIGENT MEDIA TRANSLATOR 70
CTRLR
Text Chat
24
25
23
41
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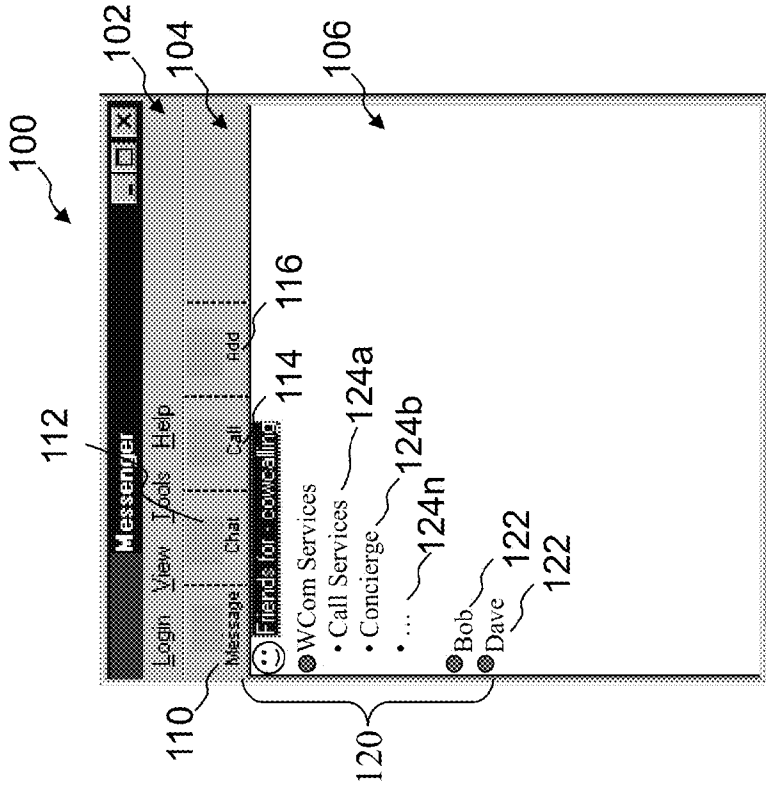
FIG. 1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104
106
112
116
114
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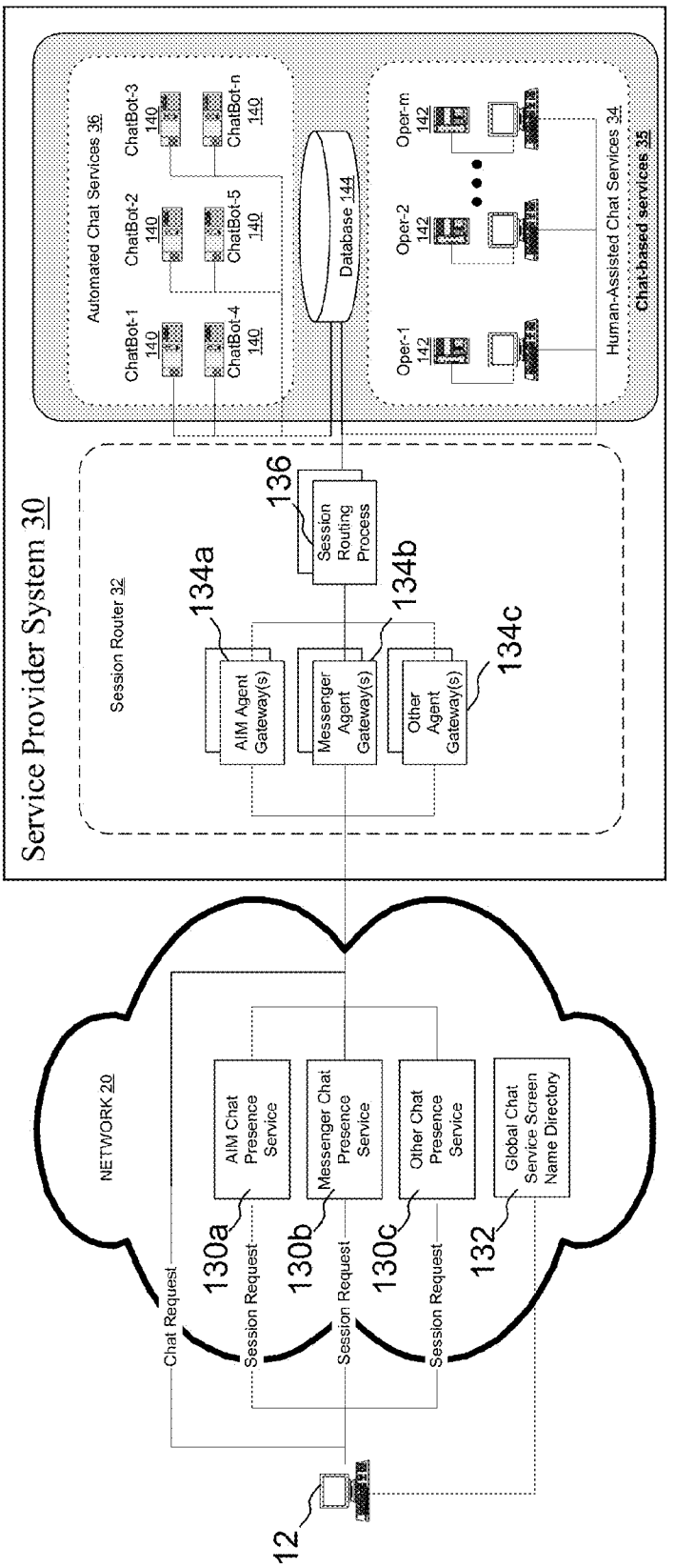
124b
124n
122
122
110
120
Messenger
Login View Tools Help
Message Chat Call Add
Friends for conc alling
WCom Services
• Call Services
• Concierge
• ...
Bob
Dave

FIG. 2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Session Router 32
Automated Chat Services 36
ChatBot-1 140
ChatBot-2 140
ChatBot-3 140
ChatBot-4 140
ChatBot-5 140
ChatBot-n 140
Database 144
Human-Assisted Chat Services 34
Chat-based services 38
Oper-1 142
Oper-2 142
Oper-m 142
136
Session Routing Process
134a
134b
134c
AIM Agent Gateway(s)
Messenger Agent Gateway(s)
Other Agent Gateway(s)
NETWORK 20
AIM Chat Presence Service
Messenger Chat Presence Service
Other Chat Presence Service
Global Chat Service Screen Name Directory
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130b
130c
132
Chat Request
Session Request
Session Request
Session Request
12

FIG. 3

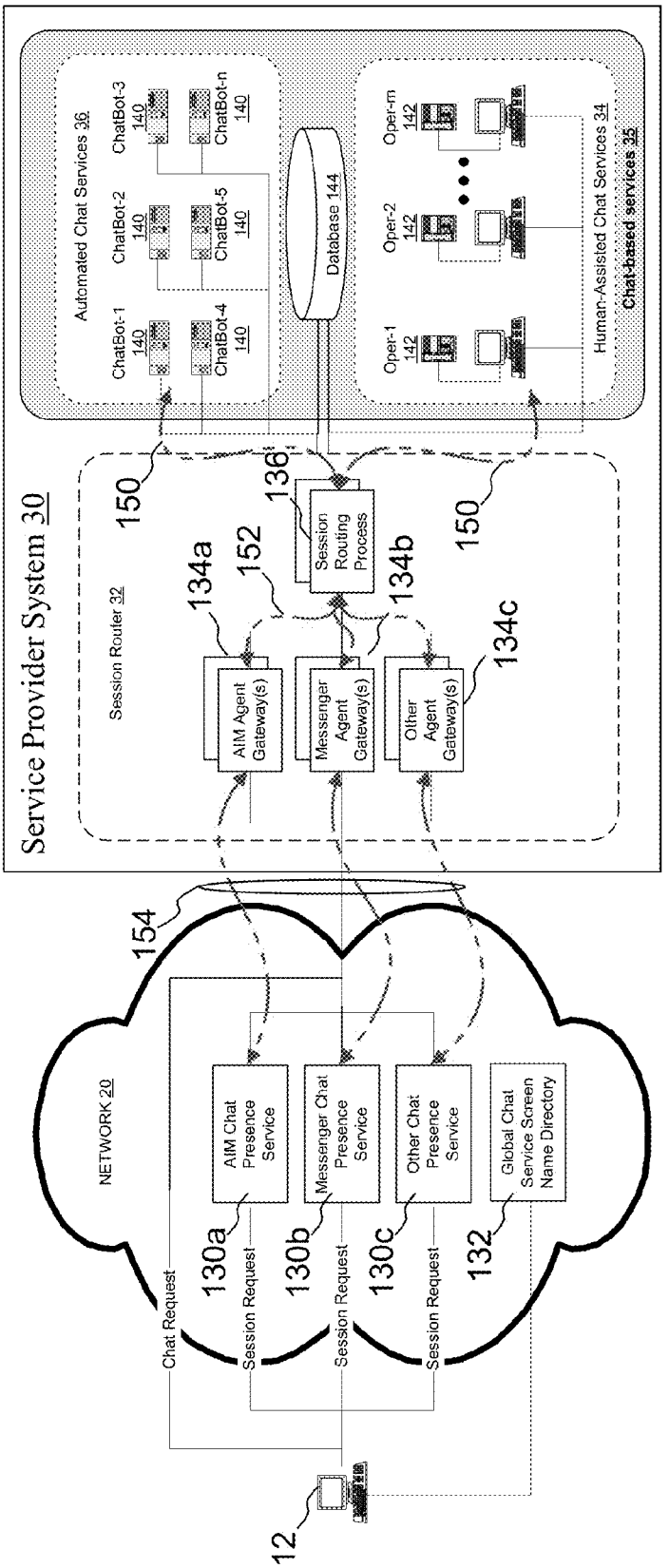

Service Provider System 30
Session Router 32
Automated Chat Services 36
ChatBot-1 140
ChatBot-2 140
ChatBot-3 140
ChatBot-4 140
ChatBot-5 140
ChatBot-n 140
Database 144
Human-Assisted Chat Services 34
Chat-based services 35
Oper-1 142
Oper-2 142
Oper-m 142
Session Routing Process
AIM Agent Gateway(s)
Messenger Agent Gateway(s)
Other Agent Gateway(s)
150
136
134a
152
134b
134c
154
NETWORK 20
AIM Chat Presence Service
Messenger Chat Presence Service
Other Chat Presence Service
Global Chat Service Screen Name Directory
130a
130b
130c
132
Chat Request
Session Request
Session Request
Session Request
12

FIG. 4

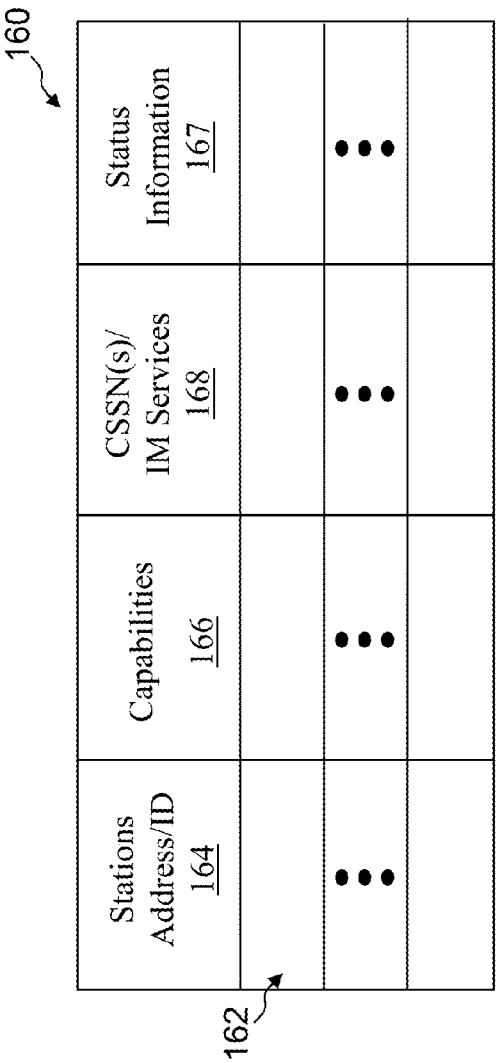

160
Stations Address/ID 164
Capabilities 166
CSSN(s)/ IM Services 168
Status Information 167
162

FIG. 5A

170
Chat Client Address 173
CCSN 174
Servicing Agent Gateway 175
Servicing Station Address 176
Session ID 177
172

FIG. 5B

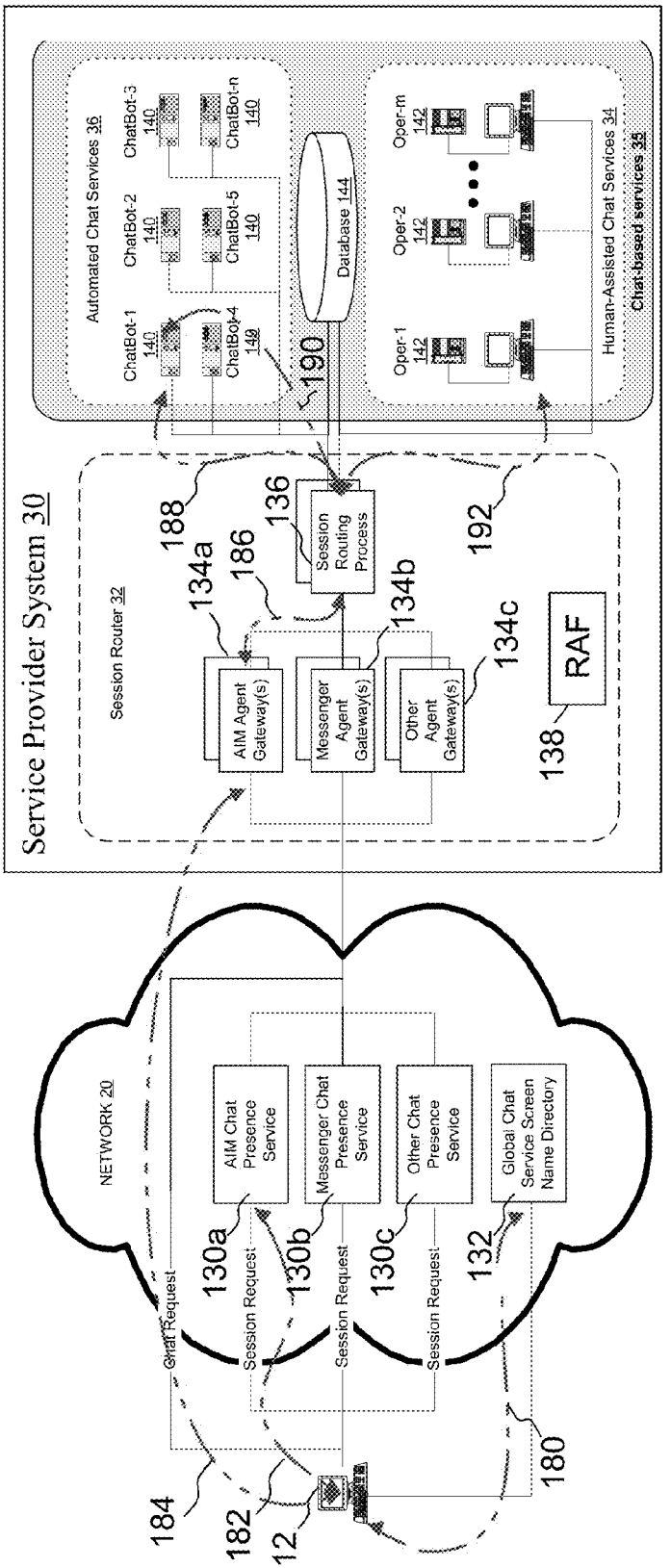
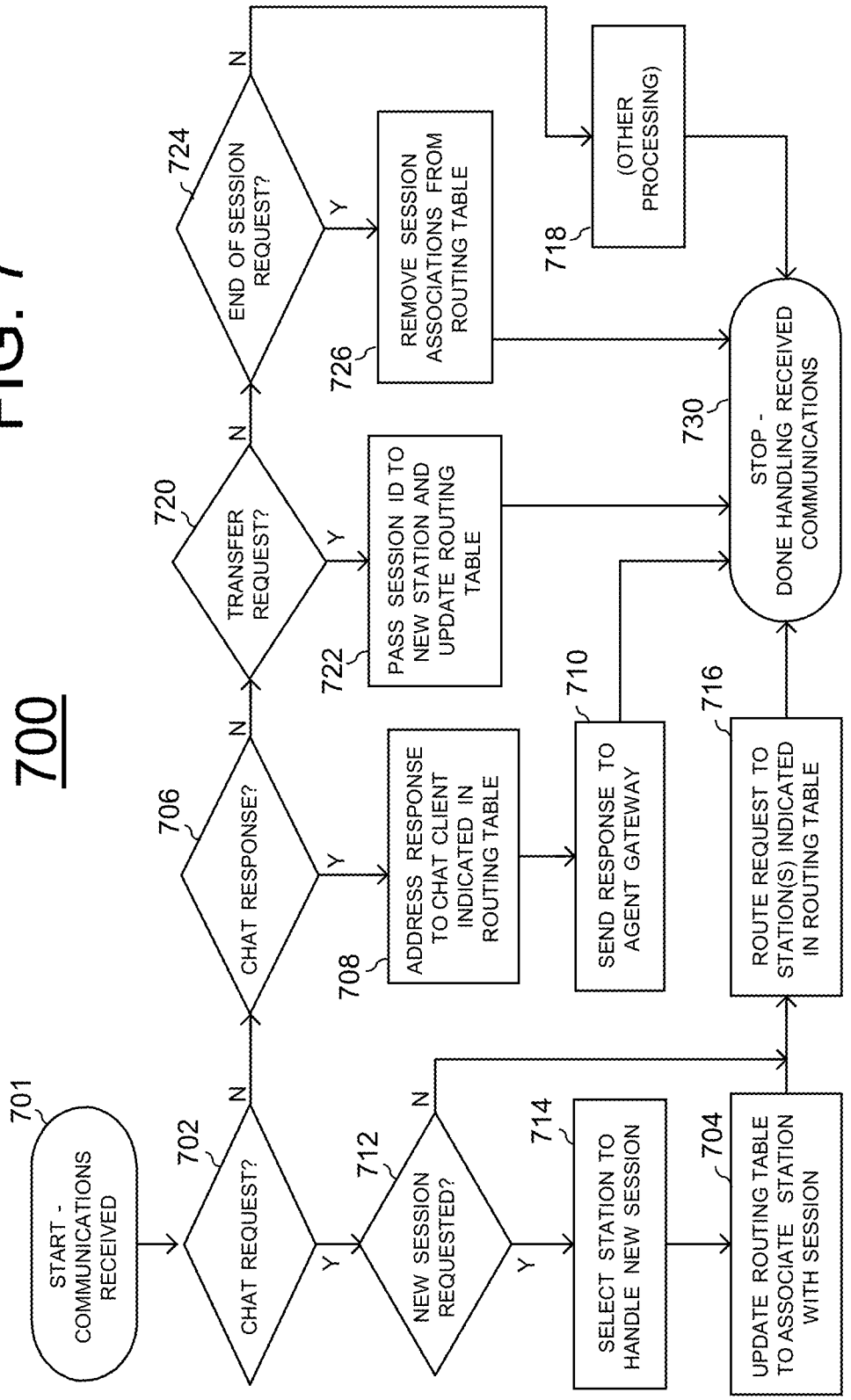

Service Provider System 30
Automated Chat Services 36
ChatBot-1 140
ChatBot-2 140
ChatBot-3 140
ChatBot-4 140
ChatBot-5 140
ChatBot-n 140
Database 144
Human-Assisted Chat Services 34
Chat-based services 35
Oper-1 142
Oper-2 142
Oper-m 142
190
Session Router 32
188
186
136
Session Routing Process
192
134a
134b
134c
AIM Agent Gateway(s)
Messenger Agent Gateway(s)
Other Agent Gateway(s)
RAF
138
NETWORK 20
AIM Chat Presence Service
Messenger Chat Presence Service
Other Chat Presence Service
Global Chat Service Screen Name Directory
130a
130b
130c
132
Chat Request
Session Request
Session Request
Session Request
180
184
182
12

FIG. 6

FIG. 7


700
701
START - COMMUNICATIONS RECEIVED
702
CHAT REQUEST?
Y
N
704
UPDATE ROUTING TABLE TO ASSOCIATE STATION WITH SESSION
706
CHAT RESPONSE?
Y
N
708
ADDRESS RESPONSE TO CHAT CLIENT INDICATED IN ROUTING TABLE
710
SEND RESPONSE TO AGENT GATEWAY
712
NEW SESSION REQUESTED?
Y
N
714
SELECT STATION TO HANDLE NEW SESSION
716
ROUTE REQUEST TO STATION(S) INDICATED IN ROUTING TABLE
718
(OTHER PROCESSING)
720
TRANSFER REQUEST?
Y
N
722
PASS SESSION ID TO NEW STATION AND UPDATE ROUTING TABLE
724
END OF SESSION REQUEST?
Y
N
726
REMOVE SESSION ASSOCIATIONS FROM ROUTING TABLE
730
STOP - DONE HANDLING RECEIVED COMMUNICATIONS

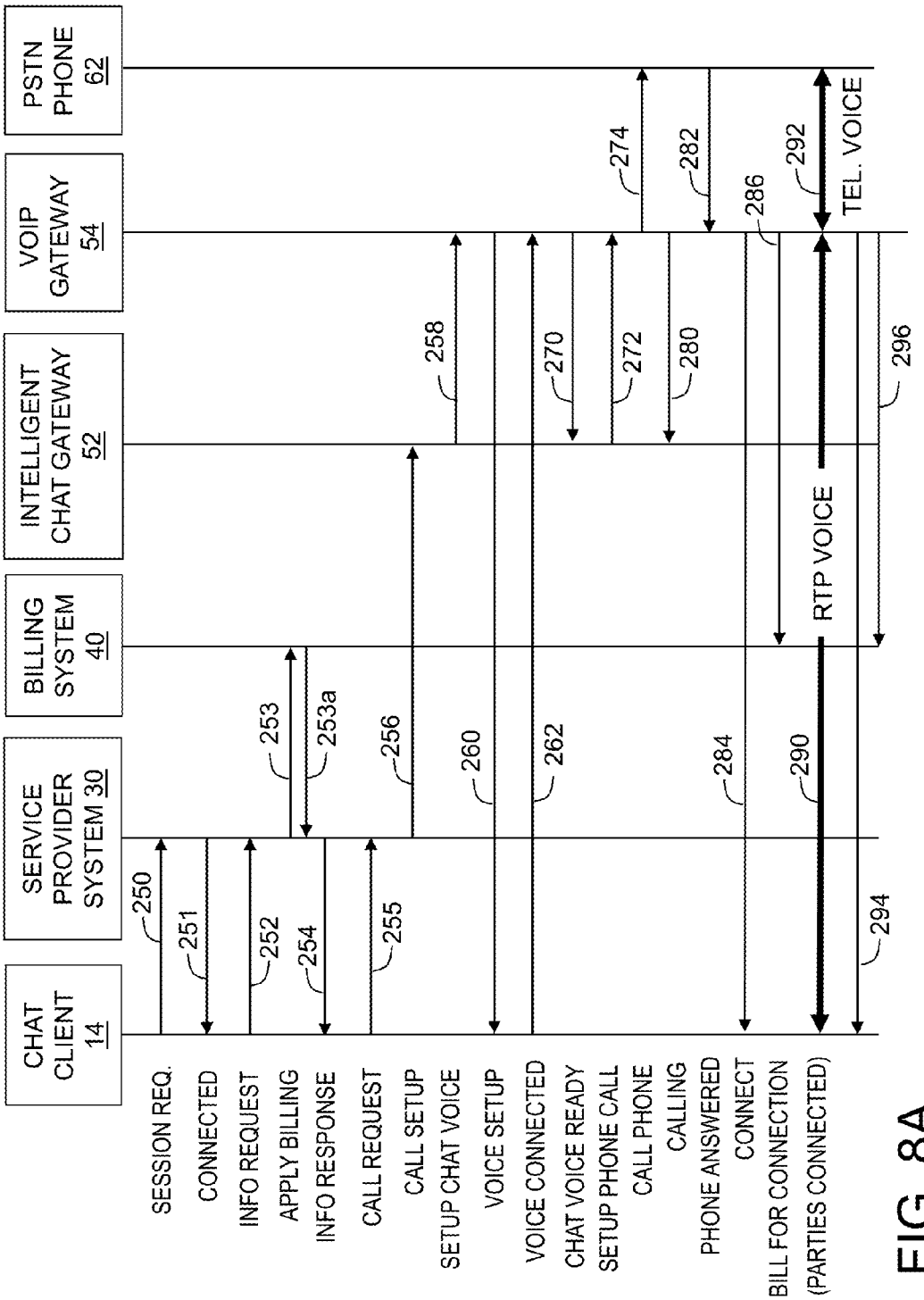

CHAT CLIENT 14
SERVICE PROVIDER SYSTEM 30
BILLING SYSTEM 40
INTELLIGENT CHAT GATEWAY 52
VOIP GATEWAY 54
PSTN PHONE 62
SESSION REQ.
CONNECTED
INFO REQUEST
APPLY BILLING
INFO RESPONSE
CALL REQUEST
CALL SETUP
SETUP CHAT VOICE
VOICE SETUP
VOICE CONNECTED
CHAT VOICE READY
SETUP PHONE CALL
CALL PHONE
CALLING
PHONE ANSWERED
CONNECT
BILL FOR CONNECTION
(PARTIES CONNECTED)
RTP VOICE
TEL. VOICE
250
251
252
253
253a
254
255
256
258
260
262
270
272
274
280
282
284
286
290
292
294
296

FIG. 8A

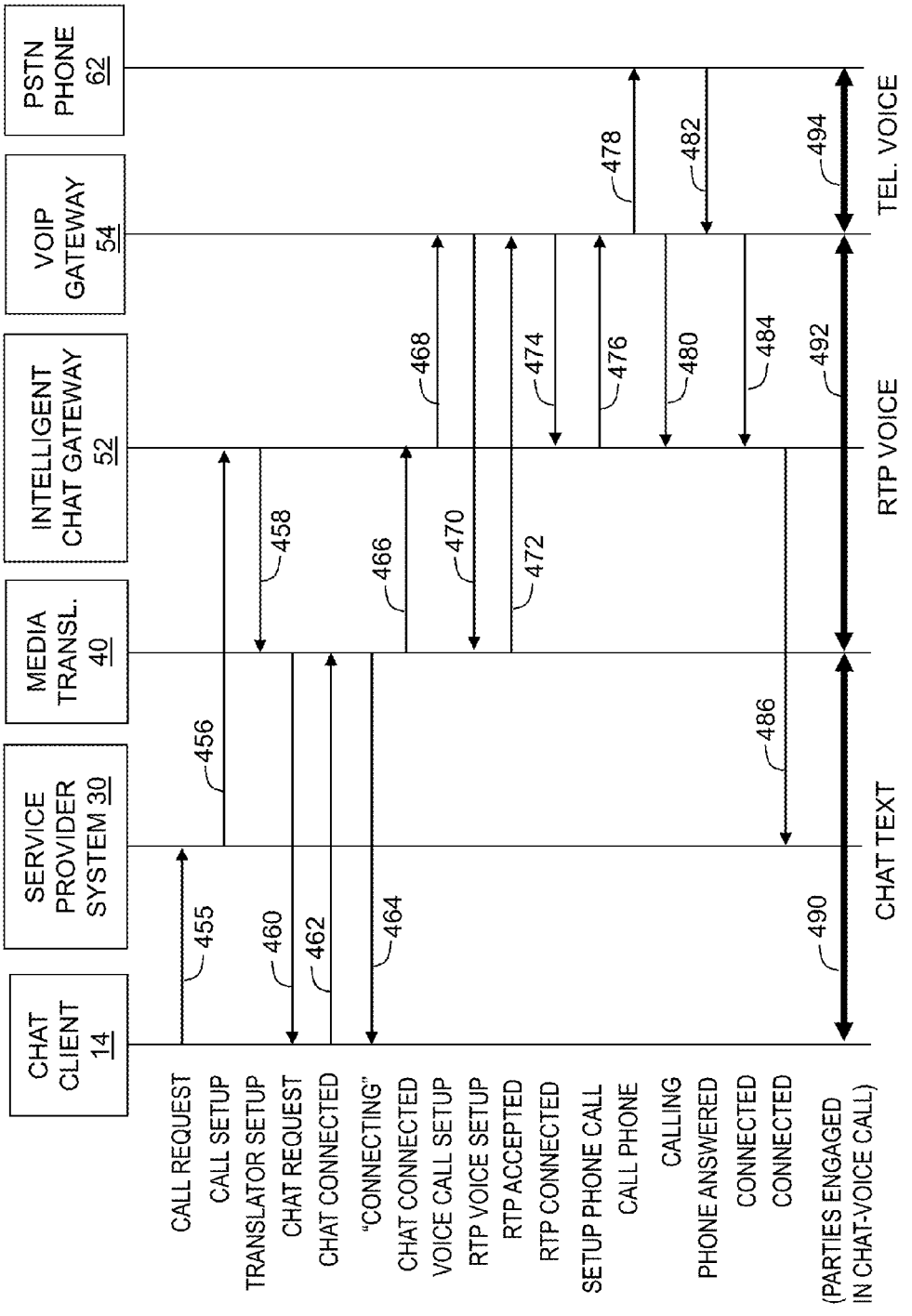

CHAT CLIENT 14
SERVICE PROVIDER SYSTEM 30
MEDIA TRANSL. 40
INTELLIGENT CHAT GATEWAY 52
VOIP GATEWAY 54
PSTN PHONE 62
CALL REQUEST
CALL SETUP
TRANSLATOR SETUP
CHAT REQUEST
CHAT CONNECTED
"CONNECTING"
CHAT CONNECTED
VOICE CALL SETUP
RTP VOICE SETUP
RTP ACCEPTED
RTP CONNECTED
SETUP PHONE CALL
CALL PHONE
CALLING
PHONE ANSWERED
CONNECTED
CONNECTED
(PARTIES ENGAGED IN CHAT-VOICE CALL)
455
456
458
460
462
464
466
468
470
472
474
476
478
480
482
484
486
490
492
494
CHAT TEXT
RTP VOICE
TEL. VOICE

FIG. 8B

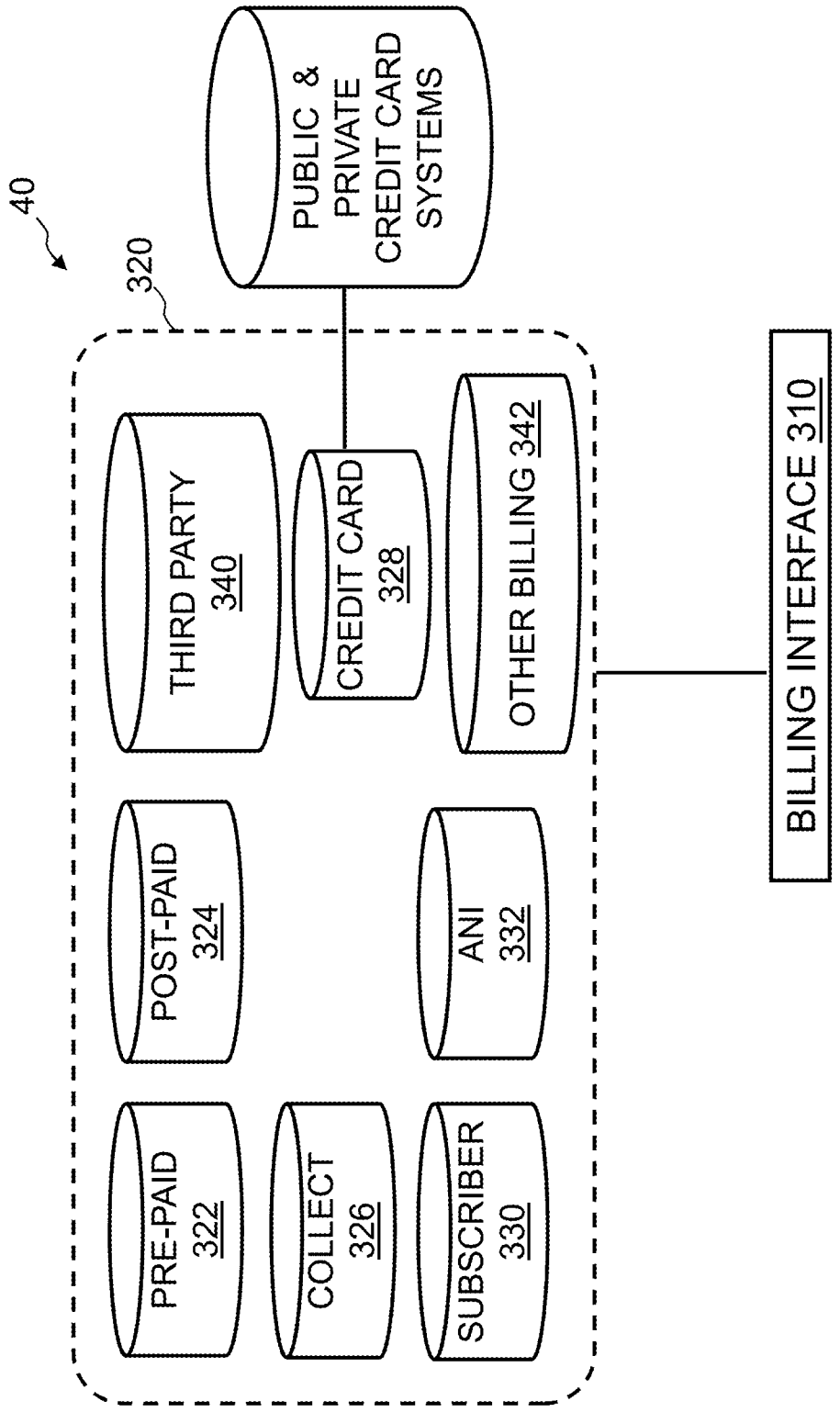

40
320
PUBLIC & PRIVATE CREDIT CARD SYSTEMS
THIRD PARTY 340
CREDIT CARD 328
OTHER BILLING 342
BILLING INTERFACE 310
POST-PAID 324
ANI 332
PRE-PAID 322
COLLECT 326
SUBSCRIBER 330

FIG. 9

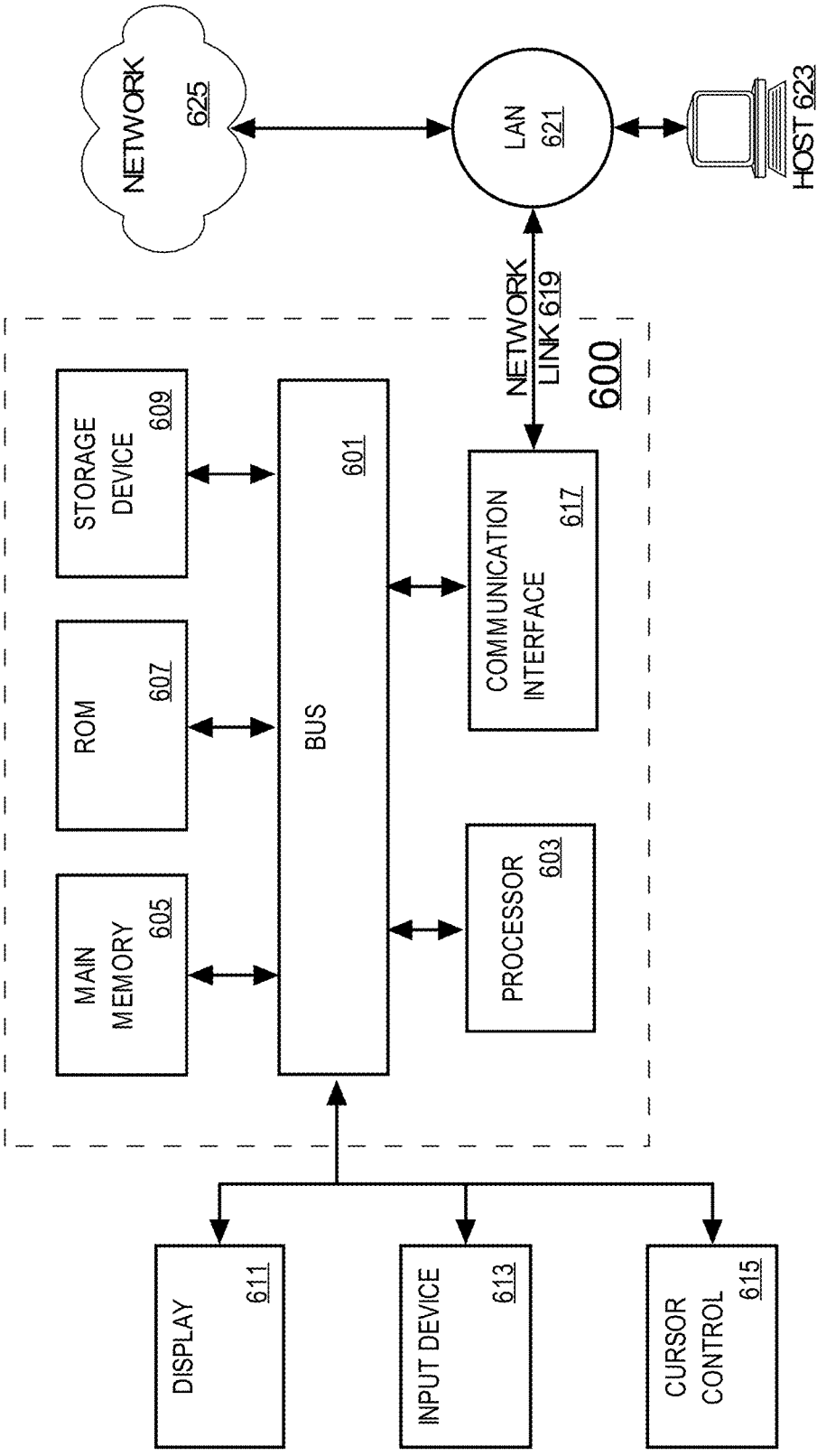

NETWORK
625
LAN
621
HOST 623
NETWORK
LINK 619
600
STORAGE
DEVICE
609
ROM
607
MAIN
MEMORY
605
BUS
601
COMMUNICATION
INTERFACE
617
PROCESSOR
603
DISPLAY
611
INPUT DEVICE
613
CURSOR
CONTROL
615

FIG. 10

COMMUNICATION CONVERTER FOR CONVERTING AUDIO INFORMATION/TEXTUAL INFORMATION TO CORRESPONDING TEXTUAL INFORMATION/AUDIO INFORMATION

RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 10/404,093, filed Apr. 2, 2003, which claims priority to U.S. Provisional Patent Application Ser. No. 60/369,271, filed Apr. 2, 2002; the entireties of which are incorporated herein by reference.

The present application is also related to the following co-pending applications, which are assigned to the assignee of the present application and incorporated herein by reference in their entireties:

U.S. patent application Ser. No. 10/404,110, filed Apr. 2, 2003, and entitled "Billing System for Services Provided via Instant Communications;"

U.S. patent application Ser. No. 10/404,111, filed Apr. 2, 2003, and entitled "Messaging Response System;"

U.S. patent application Ser. No. 10/404,113, filed Apr. 2, 2003, and entitled "Communications Gateway with Messaging Communications Interface;"

U.S. patent application Ser. No. 10/404,104, filed Apr. 2, 2003, and entitled "Billing System for Communications Services involving Telephony and Instant Communications;"

U.S. patent application Ser. No. 10/404,330, filed Apr. 2, 2003, and entitled "Call Completion via Instant Communications Client;"

U.S. patent application Ser. No. 10/404,079, filed Apr. 2, 2003, and entitled "Enhanced Services Call Completion;"

U.S. patent application Ser. No. 10/404,541, filed Apr. 2, 2003, and entitled "Providing of Presence Information to a Telephony Services System;" and

U.S. patent application Ser. No. 10/404,094, filed Apr. 2, 2003, and entitled "Telephony Services System with Instant Communications Enhancements."

The present application relates to subject matter disclosed in U.S. Pat. No. 6,351,464. The present application also relates to subject matter described in Internet Engineering Task Force document RFC 2778, *"A Model for Presence and Instant Messaging"* by Day, M., Rosenberg, J. and H. Sugano, February 2000.

BACKGROUND

1. Technical Field

The present invention relates in general to data processing and, in particular, to permitting access to services through instant messaging communications.

2. Description of the Related Art

In traditional telephony, a variety of operator services have been available from telephone service providers. In general, operator services entail an agent of the service provider assisting a telephony caller in establishing or conducting communications sessions. In some cases, this agent may be a human operator who converses with a caller to provide assistance. The agent may also be an automated system that responds to a caller's voice or keypad inputs by providing assistance or by otherwise acting upon the caller's inputs.

One well-known example of an operator service is "directory assistance" by which a caller may request and receive the telephone number of another party from a service provider agent. Operator services may additionally be utilized to, on behalf of a caller, perform acts such as call completion, establish multi-party conference calls, provide access to telephony services by callers employing calling cards or alternate billing arrangements (e.g., calling collect), provide relay or other services to special needs callers, etc.

In the case of directory assistance services, the caller desires to initiate a telephone call to another party, but does not know the correct telephone number to dial to reach the party. In a conventional directory assistance scenario, the caller first dials an operator ("0") or a directory assistance number ("411" or Area Code+"555-1212"), and the caller is connected to an agent. The caller then indicates to the agent which party they desire to reach. The agent consults a list or database to locate a telephone number or other information relating to the identified party and provides the information to the caller verbally or by computer-synthesized speech. The caller may simply record the information for future reference or may immediately seek to contact the party by dialing the provided telephone number.

In many implementations, the agent may also offer the caller the option to automatically complete the call to the other party as an extension of the directory assistance call, thus saving the caller from having to record the telephone number provided by directory assistance and then immediately re-enter the telephone number in a subsequent call attempt. Such directory assistance and call completion services are often provided at a fee which the service provider may bill to the caller or seek to have paid immediately, such as through a pay telephone.

More recently, sources of directory information and the like have become available on the Internet. A person needing contact information for another party may access a website via the Internet using a browser application and enter identifying information about a party. In order to facilitate entry of the identifying information, a form is typically presented comprising entry fields for name (of a person or business), address, city, state, etc. so that the user initiating the inquiry can specify whatever information is known about the party for which contact information is sought. The greater the specificity provided by the requestor, the fewer candidate records will be returned by the website's search engine.

Although many directory information services available on the Internet are provided free of charge, the information provided is often incomplete or outdated. Many of the databases underlying such websites are not derived in a direct and timely manner from current information used by the communications service providers in routing calls, but are instead compiled indirectly from other sources. In the case where a directory look-up website cannot resolve a given request or cannot find any records, it is ambiguous whether the request is inherently unserviceable or whether the website merely lacks the necessary data. Many such websites simply provide links to other similar sites that the user may try.

Quite frequently, a person is using a computer to perform various tasks when the need arises to obtain contact information for a given party. This contact information might be needed for immediately establishing communications with the party, such as through a telephone call. Alternatively, this contact information may be needed as part of a task on the computer, such as preparing an outgoing letter or a report that is to include the contact information. Naturally, the person engaged in such a task will want to use the computer to obtain the contact information, particularly if the computer is coupled to the Internet and may access directory look-up websites as described above.

One advantage of employing this approach, rather than making a telephone call to a directory assistance agent, is that the desired information is returned to the computer system in

a textual format which may be readily copied and "pasted" into a word processing document, database or other application running on the computer system. By receiving and entering the information in entirely electronic form, the user is saved considerable time and effort as compared to obtaining the desired information from a directory assistance agent in audio format and then manually entering the information into the computer system. The reduction in time and effort is particularly significant when the information comprises lengthy data, such as a complete mailing address and/or secondary contact information (e.g., mobile telephone number, fax number, e-mail address, website URL).

Another significant factor which motivates directory look-up online is the prevalence of "dial-up" modem connections to the Internet. If a user has access to only a single telephone line and the user is already utilizing the telephone line to connect to the Internet, it is burdensome for the user to "drop" the modem connection to the Internet and place a conventional telephone call to obtain directory assistance services. Furthermore, online directory information may be free of charge or less costly than calling a directory assistance operator.

SUMMARY OF THE PRESENT INVENTION

In recognition of the foregoing, the present invention provides methods, systems and program products that provide access to services, such as directory assistance, through a textual instant communications, such as an instant messaging or so-called "chat" session. An entity such as a commercial service provider may provide information or may otherwise be able to provide services through an instant messaging or short messaging interaction. Using a chat client application of some type, parties needing such services or information establish instant communications with the service providing entity. The service providing entity is preferably identified to such parties using a particular "screen name" identifier. A "screen name" is one term applied to an identifier by which a party is known in the context of a particular messaging service or messaging system. The service providing entity may provide one or more respondents or "chat agents" to handle and respond to requests from parties accessing the service.

In accordance with the present invention, access to services over a network is provided via a chat session. An entity, such as a commercial service provider having access to information, provides a message response system comprising one or more chat agents capable of responding to requests from chat clients. A chat agent may be a human-operated messaging station or an automated respondent acting through a messaging station or messaging client interface.

In accordance with a preferred embodiment, the service provider may simultaneously communicate with, and fulfill requests for, many different parties even though the same screen name for the service provider may be known to and used by many parties substantially simultaneously. In accordance with a novel aspect of some embodiments of the present invention, volumes of incoming requests may be distributed among a plurality of chat respondents representing the service provider and may be properly dealt with on an individual basis, even though all inbound requests may be addressed to the same screen name. This behavior is achieved by a new and useful approach to routing messaging communications, such as to a respondent messaging station, based on the originator's identity or screen name rather than based upon the recipient address specified in the messaging communications.

According to a method described herein, a chat agent gateway indicates its presence to an instant messaging presence service to inform chat clients of its availability to receive requests for service. In response to the agent gateway receiving a request by a chat client for services via a chat session, the chat agent gateway forwards the request to a station within a chat-based services system. The station then provides the requested services, and the chat agent gateway communicates information regarding the requested services to the chat client in the chat session.

In accordance with some embodiments of the present invention, a chat-accessible service system offers the ability for a requestor using a chat client to have a call to another party completed upon demand via the service system.

In accordance with some embodiments of the present invention, a chat accessible service system may establish communications between a chat client and another party through a computer telephony connection, a voice-enabled chat connection or a translated text-chat-to-telephone-voice connection.

An exemplary embodiment of the present invention discloses a communication converter comprising speech receiving means acting to receive audio information, speech-to-text conversion means acting to convert audio information from the speech receiving means into corresponding textual information, and textual information output means acting to provide the textual information to a first instant communications client.

Another exemplary embodiment of the present invention discloses a communication converter comprising textual information receiving means acting to receive textual information from a first instant communications client, text-to-speech conversion means acting to convert the textual information into corresponding audio information, and audio information output means acting to provide the audio information to a first party via a telephony connection.

Another exemplary embodiment of the present invention discloses a communication converter acting to facilitate communication among a telephony connection and an instant communications client. The translator comprising an instant communications interface acting to conduct messaging communications involving the instant communications client, a telephony communications interface acting to communicate audio information via the telephony connection, and a translating means acting to perform at least one of speech-to-text translation and text-to-speech translation between the audio information and the messaging communications.

Another exemplary embodiment of the present invention discloses a method for facilitating communications between a telephone connection and an instant communications client. The method comprising receiving textual information from the instant communications client, translating the textual information into corresponding audio information, and providing the audio information to be coupled to the telephone connection.

Another exemplary embodiment of the present invention discloses a method for facilitating communications between a telephone connection and an instant communications client. The method comprising receiving audio information via the telephone connection, translating the audio information into corresponding textual information, and providing the textual information to be communicated to the instant communications client.

Another exemplary embodiment of the present invention discloses a computer-readable medium comprising instructions which, when executed by a processor, cause a communications system to perform a method for facilitating com-

munications between a telephone connection and an instant communications client. The method comprising receiving textual information from the instant communications client, translating the textual information into corresponding audio information, and providing the audio information to be coupled to the telephone connection.

Another exemplary embodiment of the present invention discloses a method for facilitating communications between a telephone connection and an instant communications client. The method comprising receiving audio information via the telephone connection, translating the audio information into corresponding textual information, and providing the textual information to be communicated to the instant communications client.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIG. **1** illustrates a high level block diagram of an embodiment of a communication system that supports chat-based access to services in accordance with the present invention;

FIG. **2** depicts an exemplary graphical user interface of a chat client in accordance with one embodiment of the present invention;

FIG. **3** illustrates a more detailed depiction of the network and service provider system of the communication system shown in FIG. **1**;

FIG. **4** depicts an exemplary method by which automated and human-assisted stations within the service provider system of FIG. **3** register presence of a chat-based service screen name with an instant messaging service;

FIG. **5**A illustrates an exemplary embodiment of a registration table utilized by the session routing process depicted in FIG. **4** to track human-assisted and automated stations registered with the session routing process and their respective capabilities;

FIG. **5**B illustrates an exemplary embodiment of a routing table utilized by the session routing process depicted in FIG. **4** to route requests for services and responses to such requests between the agent gateways and the human-assisted and automated stations;

FIG. **6** depicts an exemplary scenario by which a chat client accesses chat-based services in accordance with the present invention;

FIG. **7** is a high level logical flowchart of an exemplary method by which the session routing process illustrated in FIG. **6** routes communication between stations within the chat-based service system and agent gateways in accordance with the present invention;

FIGS. **8**A-**8**B are call flow diagrams of an exemplary sequence of communications by which a chat client accesses chat-based call completion services in accordance with the present invention;

FIG. **9** is a high-level step diagram of an exemplary embodiment of a billing system in accordance with the present invention; and

FIG. **10** depicts a computer system that can be used to implement an embodiment of the present invention or to implement various elements thereof.

In the figures, like reference numbers generally indicate identical, functionally similar and/or structurally similar elements.

DETAILED DESCRIPTION

Systems, methods and computer-implemented processes for call processing are described. In the following description, for the purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that the present invention may be practiced without these specific details or with an alternative equivalent arrangement. In other instances, well-known structures and devices are shown in block diagram form in order to avoid unnecessarily obscuring the present invention.

The present invention achieves advantages in that parties are able to access services via instant communications, such as by instant messaging. In accordance with a preferred embodiment, the present invention further provides that one type of service accessible via instant communications involves parties being able to initiate other communications sessions, even those involving telephone networks. In one example application of this capability, a first party using an instant messaging client may establish communications with a second party who is accessible by telephone.

One form of communications popularized in recent years is electronic messaging communications. Messaging communications are generally characterized by a communicating party determining a finite amount of information to be sent as a message. Messaging communications typically involve one or more discrete messages sent by a party to one or more other parties. A message may comprise text, data or digitized audio or video information, for example, or even combinations of these. Electronic mail (e-mail) and text paging are forms of electronic messaging communications.

In contrast to messaging, other forms of communications, such as telephony, enable a period of essentially continuous (and usually full duplex) two-way conversation between parties in the context of a single session or connection. As in the example of telephony, the parties generally only determine the time duration of the overall session and are not engaged in composing and sending messages of a specific size.

'Instant messaging' refers to messaging communications wherein the delays in readying the message for delivery (such as addressing to a recipient), transporting the message, and bringing the message to the attention of the recipient are sufficiently short or imperceptible that parties may communicate in a nearly conversational manner. In the case of a form of instant communications known as 'text chat' sessions, the conversational pace is often limited mainly by the time it takes for chat participants to compose and finalize messages to be transmitted. The acceptable margin of delay in message transmission may be on a different scale than for the end-to-end delay margins in telephone communications, but the objectionable impact of excess delay on perceived fluency of communications is a common detriment to both modes of communication.

Instant messaging may be considered a type of instant communications. Some popular applications that are commonly used for instant messaging include, for example, America Online (AOL) Instant Messenger™ (hereinafter AIM), Yahoo!® Messenger and MSN® Messenger. The present invention is not limited to embodiments using these specific applications, technologies or services.

In one sense, 'instant communications' may refer to a style of communicating wherein the communicating parties expe-

rience substantially immediate establishment of communications on a per-message basis. In the context of instant messaging, a selection made be initially made by a first party to open a dialog with a specific second party. Thereafter, the parties may spontaneously generate and send messages without having to address each message or perform other steps preparatory to the sending of each message.

Furthermore, the term "instant communications" may be applicable in the sense of there being no user-perceivable session establishment as each message is sent, even though each message is in fact sent as a brief burst of information transmission activity through the network. At some level, each transmission burst may be handled as a separate communications session.

The user does not have to engage in per-message establishment of a session, if applicable, nor is any significant delay perceived by the user arising from automatic session initiation that might be briefly performed at some level through, for example, a TCP/IP connection. In one regard, then, the instancy of instant communications may be viewed as relating to the performance of session initiation and addressing without burdening the user and with sufficiently little delay as to be minimally perceptible or inconsequential to the user.

Instant communications may also be 'instant' in the sense that, when a message is composed and sent, it is fairly immediately routed to a destination, such as an instant messaging client. As a message is composed and sent, the sending party may be provided with some indication that the destination is ready to receive messages or at least has recently claimed to be open to receiving messages. This forehand knowledge may be provided by presence technology described below. Except for very brief queueing in data buffers in routers and transmission equipment in the course of transmission, the message is not substantially stored anywhere in the network for the purpose of being delivered to the recipient at a later time or at a time determined by the recipient.

This instantaneous handling of messages may be contrasted to a typical e-mail system, wherein a message is often stored in a repository for a significant time period waiting for the recipient mail client application to poll for new mail items to download from the mail server. An electronic mail message may be stored on an e-mail server for a time duration of less than a minute, for several hours, for several days or even indefinitely.

After polling a mail server and downloading any new messages, an e-mail client typically terminates communication with the mail server until a future time when the mail client again polls the server. The polling may be triggered by a time interval setting or by manual request from a user. Between such polling times, the mail server or service merely stores messages.

Another characteristic typical of instant communications is immediate presentation of the message content to the receiving party upon arrival of the message. A message received by an instant messaging client is immediately presented, such as in a window in a graphical user interface on a display device, or otherwise made known to the receiving party. The user is not required to take any action to receive or initiate delivery of each message that arrives. Message reception and presentation is usually automatic and immediate.

In contrast to electronic mail clients, it is generally unnecessary in instant communications for the user to poll a server either manually or automatically at certain time intervals, nor is the user require to take additional action, as there is with "opening" an e-mail, to have the content displayed. Furthermore, unlike an e-mail 'inbox' stored as a file in a non-volatile storage device, there is typically no systematic storing of the received message at the receiving end for the purpose of presenting the message to the recipient for the first time at a time substantially later than it was received.

Instant communications may refer to any communications involving an instant communications client, such as an instant messaging client application running on a computer. An instant communications client may be an imbedded application as embodied in a personal digital assistant (PDA), mobile phone or other portable device. An instant communications client may support instant messaging, such as text-based chat. An instant communications client may also support audio communications having little enough delay to enable interaction among communicating parties in a nearly conversational style. As a mode of communication, instant communications may be contrasted to toll-quality telephony, which provides full-duplex communications, with any transmission delay being mostly attributable to propagation (at electronic speeds) and to vocoder signal processing delays. Users of text messaging and voice-enabled instant communications clients in conjunction with data transport networks may experience greater delays or less reliable transport than by a telephony mode of communication. Nevertheless, many users find instant communications to be adequate, more cost effective, and even preferable to more traditional telephony in some circumstances. The 'instant' quality of such communications achieves much more of a real-time interactive nature than paging or e-mail modes of communication.

In many implementations, instant communications are complemented by "presence" technology—a mechanism through which parties receive timely information about the availability of others to communicate. A presence service acts as an intermediary through which a party may express availability to communicate and may be informed about the availability of other parties. A description of presence technology may be found in document RFC 2778 of the Internet Engineering Task Force (IETF).

Presence technology facilitates instant messaging and supports the perceived instantaneous nature thereof. Indeed, one of the key motivations for applying presence techniques in the context of instant messaging is that, as described above, there is typically very little storage of messages for later delivery to a recipient. Consequently, it is often useful for a sending party to know, before assembling and sending messages, whether the messages are likely to be received or presented to the recipient in a timely manner. In the experience of the sending party, presence technology can be a factor affecting one's expectation or perception of instancy. To party intending to send a message, presence technology attempts to provide awareness of the availability status of the intended recipient (or at least the readiness state of the recipient's instant communications client) before communications are sent to the recipient. When a sending party does observe that a recipient is present via presence technology, the party may then confidently send communications and reasonably expect that the transmitting and presenting the message to the recipient will be immediate or nearly instantaneous. Presence differs from, for example, the placing of a collect call in that presence information for a party is often maintained before the time it is actually needed in the context of someone communicating with party.

In general, presence technology is intended to provide an up-to-date indication of the presence of other parties. Of course, availability information for a party may be subject to change and to the party's desire to accept communications. The timeliness of availability information may also vary depending on implementation. A prospective sender of communications usually does not need not perform additional

actions to ascertain presence of other parties at any point in time, such as immediately before sending a message. Instead, as in many instant messaging client applications, presence state of a group of addressees is constantly updated and indicated on a user interface. This self-updating aspect of some presence implementations further lends to the instancy and spontaneity with which users may initiate and carry on instant communications.

A communicating party may engage in instant communications using an instant communications client, such as an instant messaging client application running on a computer. An instant communications client may be an imbedded application as embodied in a personal digital assistant (PDA), mobile phone or other portable device. An instant communications client may support instant messaging, such as text-based chat. An instant communications client may also support audio communications having little enough delay to enable interaction among communicating parties in a nearly conversational style. As a mode of communication, instant communications may be contrasted to toll-quality telephony, which provides full-duplex communications with any transmission delay being mostly attributable to propagation (at electronic speeds) and to vocoder signal processing delays. Users of text messaging and voice-enabled instant communications clients in conjunction with data transport networks may experience greater delays or less reliable transport than by a telephony mode of communication. Nevertheless, many users find instant communications to be adequate, more cost effective, and even preferable to more traditional telephony in some circumstances. The 'instant' quality of such communications achieves much more of a real-time interactive nature than paging or e-mail modes of communication.

In various embodiments, the present invention advantageously employs instant communications and presence technology, as described above, to provide services to parties who are using instant communications clients as will now be described in conjunction with FIG. **1**.

With reference now to the figures, and in particular with reference to FIG. **1**, there is illustrated a high level block diagram of an embodiment of a communication system that provides chat-based services in accordance with the present invention. As illustrated, communication system **10** includes a data processing system **12** coupled by a communications network, network **20**, to a service provider system **30** that provides chat-based services. Data processing system **12** may comprise any of a desktop personal computer system, laptop or handheld computer system, personal digital assistant (PDA), mobile telephone, television set-top box, or other existing or later known or developed electronic device that supports communication with network **20**. As is well understood to those of ordinary skill in computing, in addition to operating system software (not explicitly shown), data processing system **12** may execute chat client **14** as an application. Chat client **14** is a form of instant communications client that supports real-time or substantially real-time instant messaging communication by a principal (i.e., human user, software program or combination of human user and software program) associated with data processing system **12**.

Using chat client **14**, the principal may communicate with one or more other principals accessible through network **20**. (Note that the principals who may use chat client **14**, IP telephone **92** or conventional telephone **62** as communication appliances are not separately depicted in FIG. **1**.) Chat client **14** may be implemented by or based upon well known instant messaging and/or chat client programs, such known America Online (AOL) Instant Messenger™ (hereinafter AIM), Yahoo!® Messenger, or MSN® Messenger. Alternatively, chat client **14** and instant messaging server **22** may represent proprietary, private or semi-private messaging systems which, for example, are operated within a business enterprise or organization. Chat client **14** is shown to include a number of modules **16**, **17**, **18** and **19** that enable communication via a variety of media including text, voice, images and video, respectively. Each module may support, for example, composition, transmission, encryption, encoding, and compression of outbound communications and reception, decompression, decoding, decryption and presentation of inbound communications for a given type of media.

There are several techniques for operating an instant messaging system. In accordance with one technique, a intermediary server, such as a presence server, commonly accessible to a population of users helps parties become aware of each other and establish communications. Once a set of parties have become aware of each others' network addresses, then the subsequent message traffic between the parties bypasses the common server and passes directly between the chat clients in a peer-to-peer fashion. In accordance with another technique, chat clients establish contact with one another and carry on communications without requiring an intermediary server at all. In accordance with yet another technique, a commonly accessible server not only helps establish contact among parties but also is involved in all subsequent communications. In this case, the communicating parties need not be aware of each others network addresses, but rather only the "screen names" or handles by which they are each uniquely identified in the server.

These alternatives are represented in FIG. **1** by three connections. Connections may be logical or physical in practice and achieve an coupling or communicative interface between elements. Connections may be implemented as interprocess communications among software processes. Connections may also refer to, or be implemented as, communications between points served by a data transport network, even if the data transport network employs a so-called 'connectionless' technique of routing information within. Connection **23** between chat client **14** and instant messaging (IM) service **22** is the means by which chat client **14** may report its availability to communicate and to be informed of the availability of other parties to communicate. Connection **25** performs a similar purpose between service provider system **30** and IM service **22**. In addition to carrying presence information, connections **23** and **25** may also carry chat communications between chat client **14** and service provider system **30**, using IM service **22** as an intermediary in the chat messages.

Alternatively, connections **23** and **25** may be used solely for presence indication and another connection **24** may be formed through network **20** for carrying communications directly between chat client **14** and service provider system **30** without involving IM service **22**.

Chat client **14** of FIG. **1** may present a user interface similar to what is depicted in FIG. **2**. Referring briefly to FIG. **2** before continuing the discussion of FIG. **1**, there is illustrated an exemplary graphical user interface that may be presented by chat client **14** within a display device of data processing system **12** in accordance with one embodiment of the present invention. As shown, the graphical user interface of chat client **14** includes a messenger window **100** having a menu bar **102**, a toolbar **104** and a display frame **106**.

Within display frame **106**, a friends list **120** is displayed that contains identifiers of parties that may be contacted by chat client **14** via instant messaging. Friends list **120** (also known as a buddy list or contact list) may include both default identifiers automatically placed within friends list **120** by chat client **14** and user-supplied identifiers added to friends list

120 by a user of chat client 14 through a utility invoked by selection of add button 116 within toolbar 104. At any given moment, the listing or visual appearance of each contact in friends list 120 may be affected by presence information received from a presence server. In this manner, a principal using chat client 14 may readily determine which of the contacts is available for communicating.

In the exemplary scenario, friends list 120 is organized in a tree structure containing both individual identifiers 122 identifying individual parties (e.g., "Dave") and grouped identifiers 124*a*-124*n*, which are all related to a particular party (i.e., "WCom Services"). In this example, grouped identifiers 124 each represent a different chat-accessible service offering (e.g., call-related services and concierge service) of service provider system 30, as detailed below. One type of identifier that may be presented in friends list 120 or made accessible via other user interface elements may relate to a personalized service. By selecting this identifier in the user interface, a principal using chat client 14 may establish readily communications with a service providing entity that provides personalized services. For example, the service provider may have a specific respondent or agent principal assigned to provide services to the particular principal and to be familiar with how to provide services. When the principal selects the identifier corresponding to the personalized service, the principal is connected to the respondent assigned to serving them. This activity may also be personalized in the sense that information pertaining to the principal, such as preferences or knowledge from previous sessions, may be maintained by the service provider and applied to serving the principal.

To communicate instant messages with one of the individual parties in friends list 120 or one of the chat-accessible services, the user typically selects one of the identifiers 122, 124*a-n* within friends list 120 and then selects message button 110. As described further below, chat client 14 may then present an instant messaging window through which text instant messages can be exchanged in real time with one or more other parties. Of course, for other types of communication, such as audio or video communications, chat client 14 may provide other relevant user interface elements or controls.

Alternatively, if the user of chat client 14 desires to establish or join a chat room (i.e., typically a loosely topical forum in which a large number of users may participate), the user selects chat button 112 on toolbar 104 to invoke display by chat client 14 of a chat window through which the user can select a chat room and send and receive text messages. If the user wants to initiate a telephony call, the user can select call button 114 to invoke display of a telephony interface through which a voice-over-Internet Protocol (VoIP) call may be established. Any of the additional interfaces displayed by chat client 14 (e.g., in response to selection of buttons 110-114) may also include controls that permit a user to request specific chat-accessible services.

Such controls may be added optionally by the user or may be included as part of the messenger window 100 application. It is also contemplated, as will be readily understood by those of ordinary skill, that a convenient means for establishing communications to chat-accessible services may be implemented as an activatable control that may be added to other applications such as e-mail clients or word processing applications or may appear as an icon on a workstation's "desktop" screen. Activating such a control may cause a chat client window to appear and automatically begin a session with a specific screen name corresponding to a particular chat-accessible service. For example, a button may be added to the toolbar of an e-mail application which, when activated, instantly puts the user in contact with a service, such as a directory information service, through a chat session.

Referring now back to FIG. 1 and resuming the discussion thereof, network 20 may comprise one or more local area networks (LANs) or wide area networks (WANs), for example, the Internet, linked by conventional bridges, routers or the like. Alternatively or in addition, network 20 may include wireless networks, switched networks, and other forms of common carrier transmission lines and equipment that can link remote data processing systems, such as the data processing system 12 to service provider system 30.

Service provider system 30 is coupled to network 20 to provide services to principals communicating with service provider system 30 over network 20 using chat communications. Service provider system 30 may or may not be affiliated with the same network service provider or Internet Service Provider (ISP), if applicable, through which data processing system 12 accesses network 20. Service provider system 30 can be implemented, for example, by one or more computer systems running one or more software modules or processes. Service provider system 30 is receptive to communications, such as requests, from parties who access the system via instant communications. In a sense, service provider system 30 may be referred to as a 'service'. Users may be said to contact the service and service providers may be said to operate the service, referring in both cases to the availability of service provider system 30 in a useful capacity.

As described further below, the services provided to principals by service provider system 30 may include, without limitation, directory assistance, call completion, conference call establishment, customer support, concierge services, and other services traditionally provided by telephony operator service providers. The services may also include services not traditionally offered by telephony operator service providers, including, without limitation, video conference establishment, chat or email address assistance, or any other services presently known or contemplated or developed in the future. Because such services provide significant value, service provider 30 may be further coupled to a billing system 40 that determines charges associated with the use of the services (e.g., to a principal associated with data processing system 12, a third party, a prepaid calling card, etc.).

It is noteworthy that aspects of the present invention provide for a party requesting services to author such requests in a "free-form" manner, that is, using human-readable text in a natural style akin to conversational language. The requestor may not be required to compose textual requests obeying a certain syntax. Access to services afforded in accordance with embodiments of the present invention may provide a natural language interface to many services that have heretofore never provided natural language interfaces nor perhaps human-readable interfaces of any type. In accordance with exemplary embodiments presently described, a natural language dialog carried out through a messaging communications session may be employed to invoke a separate second communications session that may be telephonic or non-messaging in nature. In a novel fashion, a textual chat session may be employed to establish another communications session wherein at least one party is able to communicate without discretely composing messages.

As will be further described later in conjunction with FIG. 3, service provider system 30 may support the provision of both human-assisted (or "operator") chat messaging stations 142 making up human-assisted chat services system 34 and automated chat messaging stations 140 making up automated chat services system 36. Either or both of automated chat services system 36 and human-assisted chat services system

34 may be included in a chat-based services system 35. Thus, chat-based services system 35 comprises a platform of messaging respondents and may support the capability of handling each session with a client data processing system 12 through automated or human interaction or a combination thereof.

It will be appreciated by those of ordinary skill in the relevant art that any of the chat services systems 34, 35 and 36 may also be referred to as corresponding functions, services or processes and may be implemented in a variety of ways involving, for example, workstation hardware, network connections and software-implemented processes.

Furthermore, as will be described further below in conjunction with FIG. 3, service provider system 30 preferably includes a session router 32 that directs chat sessions requesting services to respondent stations comprising either or both of human-assisted messaging stations 142 and automated messaging stations 140, as is required or advantageous to provide the requested service.

Still referring to FIG. 1, communication system 10 may further include a gateway system 50 coupled to network 20 or service provider system 30 to support the completion of calls between data processing system 12 and stations (e.g., telephone 62) within wireless or wired telephony networks, such as the Public Switched Telephone Network (PSTN) 60. PSTN 60 may comprise telephony switching equipment and may actually represent any form of telephone network, such as a private branch exchange (PBX), a virtual private network (VPN) or other type of network as will be appreciated by those of ordinary skill in the art.

As shown, gateway system 50 logically may include two elements: an intelligent chat gateway 52 that serves as an interface to service provider system 30 and a voice-over-Internet Protocol (VoIP) gateway 54 that serves as a telephony network interface. In general, VoIP gateway 54 is a form of packet telephony gateway similar to those well known in the art and typified by a model AS5300 gateway manufactured by Cisco Systems, Inc. However, in accordance with a novel aspect of a preferred embodiment of the present invention, such gateway function is empowered to originate communications in disparate networks rather than merely pass along signaling and bearer communications between networks. VoIP gateway 54 represents a broader class of packet telephony or voice-over-packet (VoP) gateways, meaning that it is possible to employ packet data transport networks whether or not the particular Internet Protocol is used. Via connection 59 VoIP gateway 54 interfaces to a telephone network, such as PSTN 60. Along connections 75, 78, 82, 84 and 85, VoIP gateway 54 may present much the same type of packet telephony interface as is commonly employed in communicating with IP telephones, such as IP telephone 92.

Service provider system 30 may communicate along connection 51 to intelligent chat gateway 52 to cause gateway 50 to make connections with either or both of network 20 and PSTN 60. Communication along connection 51 may comprise contact information pertaining to a messaging client that is used by the gateway to establish communications with the messaging client. In response to requests from service provider system 30, intelligent chat gateway may also communicate with other elements, such as an intelligent communication converter, which is also referred to as an intelligent media translator (IMT), 70 to coordinate desired connections among parties.

Intelligent chat gateway 52 may issue instructions or send information along connection 53 to VoIP gateway 54 to cause, or to facilitate the formation of, communication pathways through the latter. In practice, connections 51 and 53 may each be a data path through network 20, perhaps secured by encryption, firewalling, IPsec practices, or other measures. With respect to service provider system 30, connection 51 represents a network control interface by which one or more communications networks may be controlled, such as through gateway 50.

Intelligent chat gateway 52, in conjunction with other elements such as service provider system 30, may implement a method for managing messaging communications through a gateway, the method involving receiving indication that communications are to be established through the gateway and then causing the gateway to engage, for example, in communications involving a chat client or involving instant messaging communications. Various elements in FIG. 1 may also cooperate to implement a method whereby gateway 50, in effect via messaging interface function 55, participates in instant messaging communications or communications with instant messaging clients or servers and then some aspect of the communications through the gateway, such as formation of connections from PSTN 60 to network 20, are affected by the instant messaging activity. Such methods may be implemented as computer program products for execution by computer processing devices and may be conveyed via computer-readable medium or by transmission of executable instructions. Thus, in some implementations, messaging interface function 55 may endow intelligent chat gateway 52, or gateway 50 in general, with the ability to interact with instant communications systems, such as IM service 22, in establishing instant communications sessions involving gateway 50 or IMT 70.

The integration of intelligent chat gateway 52 into gateway 50 as shown in FIG. 1 is but one contemplated embodiment. In various embodiments, intelligent chat gateway 52 may be implemented in hardware and/or software in combination with either or both of service provider system 30 and VoIP gateway 54 or as a standalone system. For example, intelligent chat gateway 52 may be implemented as a software program executing on one or more computer systems forming a portion of service provider system 30; alternatively, intelligent chat gateway 52 may be implemented as a hardware adapter for and/or a software module executed by VoIP gateway 54. Gateway 50 may be viewed as a network element in a larger communications network or system comprising, for example, PSTN 60 and network 20. It is contemplated that service providing system 30 may exercise control or carry out coordination of communications through one or more communications systems through a control interface by acting upon network elements other than a gateway such as gateway 50.

The composite gateway 50 may be more generally characterized as a novel form of network element having at least one messaging communications interface by which at least one action of the network element in a communications system is affected by the messaging communications. As part of its function in the communications system, the network element may carry or control telephony traffic or other forms of non-messaging traffic. In accordance with the present teachings, many aspects of the typical functioning of network elements may be controlled by messaging communications thereto. Some aspects of the transporting, routing and processing of communications traffic performed by network elements in the communications system that may be controlled or affected by messaging communications, which may even originate as natural language requests submitted via chat messaging, may include, for example, switching, routing, ingress, egress, multiplexing, demultiplexing, encoding, decoding, monitor-

ing, translating, transforming, echo cancelling and other types of processing applied to traffic.

In accordance with one exemplary embodiment, intelligent chat gateway (ICG) **52** may be implemented as an adapter device to facilitate communications among messaging elements, such as chat client **14**, and gateway **50** via a gateway control interface, such as along connection **53**. Connection **53** represents a gateway control interface in that it is a point through which, for example, control information passes to the VoIP gateway **54** to cause it to establish connections. In FIG. **1**, intelligent chat gateway **52** is shown to comprise messaging interface function **55**, giving gateway **50** the ability to interface with IM service **22** in the role of a messaging participant, at least to some extent. Via connection **86**, gateway **50** may perform communications with IM service **22** in the course of establishing communications involving any of connections **82**, **84**, **85**, **76**, **77**, **75**, and **78**, as will be described below. Via messaging interface function **55**, intelligent chat gateway **52** may coordinate with IM service **22** in establishing communications involving chat client **14**. Such communications may be responsive to communications between service provider system **30** and ICG **52**. For example, service provider system **30** may provide indication to ICG **52** that communications are to be established involving chat client **14**. Service provider system **30** may also provide further information pertaining to said communications or may in fact issue commands to ICG **52** ultimately resulting in communications between ICG **52** and chat client **14** or between VoIP gateway **54** and chat client **14**.

In response to requests by service provider system **30**, for example, intelligent chat gateway **52** may cause VoIP gateway **54** to set up a call within PSTN **60** or establish a data path through network **20**. With respect to ICG **52**, connection **86** or connection **51** in conjunction with SPS **30** may be referred to as interfaces between ICG **52** and sources of messaging communications such as IM service **22** or chat client **14**.

In order to provide a high quality voice connection, the requested calls are preferably completed through data network **20** utilizing a voice-over-packet data stream such as a data stream compliant with the Real-time Transport Protocol (RTP), which may rival a toll-quality telephone connection. The Real-time Transport Protocol is described in the Internet Engineering Task Force document RFC 1889. Other techniques for accomplishing transport of voice data, such as asynchronous transfer mode (ATM), frame relay or other types of transport may be readily applied to implementations of the present invention. While specific types of voice data transport are mentioned in describing exemplary embodiments, the present invention is not limited to using any particular transport.

In FIG. **1**, this type of RTP connection is depicted by connections **82** and **84** through network **20**. As with all of the other "connections" shown in FIG. **1**, connection **82** represents the passage of information through network **20** in a general sense and may or may not be an actual connection in the formal sense of connection-oriented or connectionless styles of data transport. Connection **82** may represent one or more RTP-compliant pathways for data carrying voice signals among chat client **14** and VoIP gateway **54**. Connection **84** may represent the passage of signaling communications to coordinate the creation of traffic bearing connection **82**. Connection **84** may involve various call setup protocols such as elements of the ITU H.323 protocol suite or of the Session Initiation Protocol (SIP) described in IETF document RFC 3261. For example, to establish a "call" with chat client **14**, VoIP gateway **54** might send a SIP "INVITE" message to chat client **14**.

Alternatively, voice communications of lesser quality may be established if chat client **14** supports voice-enabled chat. Voice-enabled chat involves "best effort" transport of digitized voice signals through the data network and may involve delay, distortion, and interruptions in speech. Such impairments may be acceptable to some users under many circumstances. In FIG. **1**, the creation of a voice-enabled chat session between chat client **14** and VoIP gateway **54** is represented by connection **86** and connection **85**. Connection **86** is optional and may serve to allow gateway **54** to advertise its presence and locate chat client **14**, although this may be unnecessary if contact information about chat client **14** is already provided to VoIP gateway **54** in the course of signaling between service provider system **30** and intelligent chat gateway **52** and along connections **51** and **53**. Connection **86** may, in some implementations, also serve to carry ongoing communications among chat client **14** and VoIP gateway **54** using IM service **22** as an intermediary. It is also possible in some implementations that connection **86** may not be needed for either or both of initiating and carrying on communications and that connection **85** may serve as a direct connection for accomplishing either or both of these purposes.

A third alternative for communications among chat client **14** and VoIP gateway **54** involves translation between a textual interface at chat client **14** and an audio interface at VoIP gateway **54**. In some embodiments, communication system **10** may further include an information translator, such as IMT **70**, which may comprise one or both of a text-to-speech module **72** and a speech-to-text module **74** to convert between the text chat employed by chat client **14** and speech signals from telephones such as telephone **62**. Text-to-speech module **72** in FIG. **1** may represent a text-to-speech process or function and may employ DECtalk™ speech synthesis technology developed by Digital Equipment Corporation, for example. Speech-to-text module **74** may represent a speech-to-text process or function and may employ any of the well known speech recognition technologies available from companies such as Nuance, SpeechWorks, International Business Machines or Dragon Systems, for example.

IMT **70** may comprise a port, connection or other interface for receiving speech signals, a speech-to-text conversion process for converting the received speech signals into corresponding textual information, and a port, connection or other interface for providing the textual information ultimately to a messaging client, such as chat client **14**. Alternatively or additionally, IMT **70** may comprise a port, connection or other interface for receiving textual information from a messaging client, a text-to-speech conversion process for converting the received textual information into corresponding speech signals, and a port, connection or other interface for providing the speech signals through a communications medium, such as a telephone connection or RTP session.

For example, in FIG. **1**, speech information from a caller using telephone **62** is carried through PSTN **60** and arrives as a conventional telephony signal at VoIP gateway **54**. VoIP gateway **54** converts the received telephony media into a packetized data stream suitable for transport through a packet data network, such as data transport network **20**. The packetized data stream may be directed to speech-to-text module **74** to convert the received speech signals into a textual representation. This textual information may then be sent to a text chat interface of chat client **14**, perhaps in the form of a typical chat message, via network **20** and perhaps involving IM service **22**. From the standpoint of chat client **14**, IMT **70** may indeed 'appear' to be simply another chat client. An optional instant messaging sender **79***a* is depicted along connection **76** representing novel adaptation of the speech-to-text

module **74** to carry on instant communications with chat client **14**, although those of skill in the art will appreciate that such adaptation could be viewed as being a separate entity or being integrated into the function of IMT **70** or speech-to-text conversion process **74**. In any event, by virtue of speech-to-text module **74**, a user of chat client **14** will experience chat messages representing speech utterances from the party who is using telephone **62**.

As used herein, "speech" may include spoken audio utterances as well as non-spoken audio information such as audible tones, signals or sounds which have meaning or significance that is commonly recognized or at least mutually agreed upon among communicating parties. For example, sounds of laughter, musical tones, sound effects, DTMF signals or other familiar audible sounds may communicate information or express thoughts and emotions. Embodiments of the present invention may advantageously include various aspects of recognizing, interpreting, and producing such sounds as a way of enhancing communications among parties. One practical application of this might be allowing a user of the system that generates textual information to interact with a voice processing system that is accustomed to receiving DTMF tones as input.

In the discussion of IMT **70**, "text" or "textual information" may refer to, for example, symbols, characters and representations of visual or tactile elements which may or may not be actual words according to a given written or spoken language. Thus, it should be understood that text-to-speech module **72** and speech-to-text module **74** may operate to convert to/from audible signals other than spoken words and to convert to/from data representing information other than words.

In the context of facilitating communications among one party using an instant communications client and another party using a telephonic connection, a novel aspect of the present teachings relates to the manner in which symbols, known as "emoticons" and often appearing along with textual information, may be used to convey emotions, thoughts or impressions.

Because instant messaging sessions, especially chat sessions, may use a number of conventional abbreviations and so-called "emoticons", the speech-to-text module **74** and text-to-speech module **72** may employ special-purpose dictionaries (not shown) that list the proper equivalents for performing conversion among speech and text or symbols. For example, the commonly used "LOL" may be translated to the spoken equivalent of "laughing out loud" or to a sound effect that sounds like laughter. Dictionaries may be customizable to suit the preferences of communicating parties using system **10**.

IMT **70** may act to recognize sounds and render, in the conversion performed by speech to text module **74**, textual or symbolic representations that correspond to the sounds according to some conventional or desired mapping. For example, the spoken words "laugh out loud" or even the detection of sounds of laughter from one party may evoke a textual "LOL" or the like which is conveyed to the other party who is using a textual interface. Further, to aid such detection or provide more deliberate control for communicating parties, IMT **70** may be receptive to verbal commands and command delimiters indicating that a sound or spoken utterance is to be interpreted according to this feature rather than interpreted as literal words. For example, a party may say "insert" or "emoticon" followed by a desired expression such as "laugh", "frown", "puzzled", etc. Upon recognizing such a keyword, IMT **70** will interpret adjacent sounds and map the sounds detected into appropriate symbols to be sent to another party.

In performing conversion, IMT **70** may be receptive to other signals such as DTMF signals. While communicating through IMT **70**, a party using a telephone may be able to press digits on a dialing keypad to have specific emoticons or other symbols included in the textual output of the conversion module. For example, a "smiley face" representation may be sent to an instant communications user in response to a telephony user entering a sequence such as "#8" or "486", the latter of which follows the shape of a smile on a standard 12-key touch-tone keypad. DTMF tones may also be used to implement recognizable command delimiters in the context of the previous discussion.

In the course of converting speech and other audible signals into corresponding symbols or text, IMT **70** may also perform translation among different spoken and written languages, for example, converting English text to Spanish speech and vice-versa. The decision to invoke this type of conversion may be performed dynamically in response to input from the parties as the communications is established. Alternatively, language preferences or compatibilities of one or both of the parties may be known or maintained in a profile database or expressed by devices, such as chat client **14**, to affect how IMT **70** handles the communications. Language conversion may be provided as an option to users and, from a commercial standpoint, may be offered at an additional charge to offset costs or provide a profitable operation for a service provider.

As IMT **70** performs conversion, the manner in which each party perceives the other party may be affected by the interaction through the translator. For example, a male party using an instant communications client, such as chat client **14**, will likely prefer that any synthesized speech representing him to a telephony user be rendered in a male voice. Other aspects of speech rendering, such as approximate speaker age, vocal characteristics, inflection and local dialect may be alterable or configurable and may be adjusted dynamically or according to, for example, a profile maintained for a given user. In some implementations, a party might elect to use a speech persona that is whimsical or that emulates the characteristics of a popular recognizable personality. Users may pay a premium to a service provider for the use of such custom services.

Another aspect of how one party "experiences" another party relates to the identifying of the parties to one another, particularly to the party who is using an instant communications client of some nature. In conducting messaging communications, for example, one party will see chat messages coming from another party, the chat messages having actually been composed by speech-to-text module **74** based upon speech input from the other party. The apparent screen name of the remote party may be subject to control dynamically during the establishing of communications or may be affected by a profile of user preferences consulted by system **10** in the course of providing the communications service. According to various implementations, the presentation of remote user identity to the messaging user may comprise a screen name, an image or iconic representation, a sound bite or other presentable element. The manner in which a given party wants to be presented to a remote party may be the subject of interaction with an operator or interactive service providing system during or preparatory to the establishment of communications involving the parties. A service provider may optionally assess billable charges to one or both of the parties related to the provisioning, use or invocation of some of these presentation features.

In the matter of coupling IMT **70** to chat client **14**, connections **76**, **77** may be implemented as communications through network **20** even though, for simplicity, they are shown as direct connections in FIG. **1**. Moreover, connections **76**, **77** may be manipulated through session router **32**. That is, similar to the manner in which session router **32** accomplishes transfer among messaging stations within SPS **30**, session router **32** could cause communications from chat client **14** along connection **24**, for example, to merely be redirected to IMT **70**. The advantages of doing this are that the user of chat client **14** experiences continuity of the original session and that a respondent in SPS **30** may stay conferenced onto the subsequent communications, perhaps in order to facilitate the initial communications with a second party.

In similar fashion, text-to-speech module **72** may act as a chat entity involved in chat communications with chat client **14**. An optional instant messaging receiver **79***b* is shown along connection **77** for adapting text-to-speech module **72** to act as a recipient instant messaging client. As with sender **79***a*, receiver **79***b* may be implemented as, or at least conceptually viewed as, being either separate from or integral with IMT **70** or text-to-speech conversion process **72**. Sender **79***a* and receiver **79***b* may in fact be implemented as a single messaging process, similar to the manner in which chat client **14** conducts communications through connection **24**, and may carry out both sending and receiving through a single network address and port number. When a connection is established through VoIP gateway **54** and IMT **70**, a party using telephone **62** will hear synthesized speech representing chat messages as they are received from chat client **14**.

Although not explicitly shown in FIG. **1**, the passage of packetized telephony signals along connections **75** and **78** may imply packet assembler/disassembler and codec interfaces for adapting conversion processes in modules **72** and **74** in a novel manner to support the present teachings. It should be noted that connections **75** and **78** may represent other forms of bearer channel connection, such as TDM signals directly from a telephony network such as PSTN **60**. In the pursuit of coupling a telephony party at telephone **60** or IP telephone **92** to chat client **14** through IMT **70**, the voice signals may traverse a data transport network (using RTP, for example) or a telephony network (in the form of analog or TDM signals) or a combination of transport networks. The design of IMT **70** may vary accordingly to work with telephony signals in the appropriate form. The use of RTP to carry voice signals to/from IMT **70** as shown in FIG. **1** is thought to be advantageous for compatibility with VoIP gateway **54** and its ability to alternatively carry on RTP communications directly with properly equipped chat clients **14**.

In FIG. **1**, IMT **70** is shown to further comprise at least one controller **73** that may interface to, or be in communication with, either or both of intelligent chat gateway **52** and service provider system **30** as represented by connections **80**. Controller **73** may be operable to receive instructions or commands from service provider system **30** or intelligent chat gateway **52** for purposes of coordinating connections such as RTP voice communications along connections **75** and **78** and textual communications along connections **76** and **77**. Controller **73** may participate in allocating resources of text-to-speech module **72** or speech-to-text module **74** and in determining addressing or port numbers by which such modules are engaged in communication with other elements. In some embodiments, controller **73** may issue commands or information along connections **80** causing either or both of service provider system **30** and intelligent chat gateway **52** to establish communications involving IMT **70**.

Via controller **73** or the like, IMT **70** may provide a control interface means suitable for communicating various types of information in the course of arranging communications through the IMT. Some example types of information which may be communicated through the interface include: an identifier corresponding to the messaging client, an identifier corresponding to an RTP stream, an IP address, an identifier corresponding to a speech signal input port of the translator, an identifier corresponding to a speech signal output port of the translator, an identifier corresponding to a textual information receiving port of the translator, an identifier corresponding to a textual information output port of the translator, an identifier corresponding to a session involving the translator, an identifier corresponding to an instance of the speech-to-text translation means, and an identifier corresponding to an instance of the text-to-speech translation means.

It should be noted that a called party participating in communications through a telephony connection, such as through an RTP voice-over-packet session directly with chat client **14** or through IMT **70** may carry out a communication vocally through a phone and without having to compose discrete messages. In other words, messaging or other instant communications among a principal using chat client **14** and system **10** may give rise to yet other communications wherein at least some of the latter communications do not involve messaging or wherein at least one of the communicating parties does not have to compose and send discrete messages.

In FIG. **1**, service provider system **30** is also shown to be coupled to PSTN **60** via connection **56**, representing a coupling to any form of public or private telephone network. Service provider system **30** may engage in telephony signaling or otherwise coordinate with telephony systems and switches in providing services to principals. Furthermore, connection **71** shown coupling PSTN **60** to IMT **70** represents a telephony connection, such as telephone line or trunk, by which IMT **70** may communicate telephony signals with a telephone network. As described further below, connections **56** and **71** allow for a variety of interactions or cooperation with a telephone network. For example, wherever it is described that gateway **50** causes chat client **14** to communicate with telephone **60**, it should be understood that an analogous functioning through connections **56**, **71** and PSTN **60** may similarly accomplish a connection of the parties involved.

Those of ordinary skill in the art will recognize that various elements depicted in FIG. **1** may be combined or separated while still accomplishing the same general operation described herein. For example, the function of IMT **70** may be integrated with VoIP gateway **54** forming a novel gateway device or subsystem capable of interfacing directly between a telephone network and a chat client. Those of ordinary skill will also recognize that, given the exemplary embodiment described in FIG. **1**, a variety of techniques and sequences of events may be used to coordinate the formation and dissolution of communications among various elements and that a variety of signaling or control connections may be added to enable each element to receive or originate "call setup" instructions. To carry out the functions described herein, one or more of the elements shown in FIG. **1** may be coordinated in their actions using one or more controllers, such as by employing a softswitch technology as recommended by the International Softswitch Consortium or a control arrangement as described in U.S. Pat. No. 6,098,094. For example, a controller **90** may be coupled to any or all of the elements in FIG. **1** through network **20** or by a separate network or point-to-point connections. As will be apparent to persons of ordi-

nary skill in the relevant art, controller **90** may send signals to various elements through network **20** to accomplish functions described herein.

Such conversion between chat text and voice signals may be desirable or necessary if, for example, an intranet security firewall through which chat client **14** communicates is configured to block streaming IP sessions of the type utilized to carry voice communication or because a particular chat client **14** or data processing system **12** does not support voice communication (e.g., is not equipped with a microphone).

With reference now to FIG. **3**, there is illustrated a more detailed depiction of network **20** and service provider system **30** (as were introduced in FIG. **1**) in accordance with one embodiment of the present invention. As shown, network **20** comprises or is coupled to a number of instant messaging servers **130***a-c* representing different instant messaging services (e.g., AIM, MSN® Messenger, Yahoo!®, Messenger, etc.). As mentioned earlier, depending on implementation, each instant messaging service may or may not stay involved in forwarding of chat messages after a session among parties has been initiated. Each instant messaging server **130** may provide presence functionality and, in some cases, presence may be the principal function contributed by the server.

Network **20** may optionally include, or be coupled to, a global chat service screen name (CSSN) directory **132**, which a user can access through chat client **14** to learn the CSSN(s) of a service provider. CSSNs learned from global CSSN directory **132** can then be utilized to initiate chat sessions and can be selectively added to the friends list **120** of chat client **14**, as described above. Depending on availability of screen names, the CSSN for a given service may be common across all of the instant messaging service providers or may be somewhat different among providers, perhaps encouraging the use of directory **132**. Generally, throughout the present description, references to 'CSSN' should be understood to mean either or both of the global chat service screen name as described above or a screen name for the chat-based service as it is known in the context of a particular instant messaging service. Both of these are screen names by which the service may be known and accessed in one way or another.

As further illustrated in FIG. **3**, service provider system (SPS) **30** includes chat-based services system **35** and an optional session router **32**, which provides an interface between network **20** and chat-based services system **35**. By virtue of chat-based services system **35**, SPS **30** may be referred to as being, or at least comprising, a messaging response system. Chat-based services system **35** may provide both human response through zero or more (in this case, 'm') operator messaging stations **142** and automated response through zero or more (in this case, 'n') automated messaging stations (referred to herein as 'chatbots') **140**. The chat-based services provided by messaging stations **140**, **142** can include, without limitation, any of the over a hundred services now provided by telephony operator services (e.g., telephony directory assistance, call completion, customer support, concierge services, etc.) or other services not traditionally offered by telephony operator services (e.g., chat directory assistance, information retrieval services, interactive web browsing assistance, etc.).

In a first embodiment in which session router **32** is omitted, each messaging station **140**, **142** has a different CSSN (and perhaps a different CSSN for each instant messaging service) to enable peer-to-peer communication between chat clients **14** and particular messaging stations **140**, **142**. Each station **140**,**142** may log on to one or more instant messaging services. Chat clients **14** may become aware of one or more CSSNs by which to reach chat clients for a particular purpose. CSSNs for stations **140**, **142** may, for example, conform to a generic name followed by a specifier such as "DirAsst67." The provider of services could make known to prospective users that a screen name of "DirAsst" followed by any two or three digits will reach a chat agent offering a given service. On average, each of the stations having screen names "DirAsst01" through "DirAsst99" will receive an approximately equal volume of requests, especially if users are encouraged to use randomly distributed numbers such as the last two digits of their telephone number or government-issued personal identification number. If a station becomes overloaded with requests and does not respond in a timely fashion, users may try a different screen name in the same "family" of screen names but having a different suffix.

Alternatively, a directory may be provided by which a user may obtain from a service provider a screen name to be used temporarily. This is comparable to presence functionality except that the available status of an exact screen is not being obtained. Instead the user may request using a generic screen name and receive a specific, currently available screen name.

An interface by which the user might obtain a temporary screen name might itself be through a chat session with a service provider using a consistent screen name. For example, a user might contact a screen name of "DirAsst" advertised by the service provider to be a source for information. The chat session with "DirAsst" might provide a response to the user of a screen name of an available chat respondent at a more specific address such as "DirAsst34". The user may then begin a chat session with "DirAsst34" freeing up "DirAsst" to route other initial requests to other stations.

In a slight variation on this approach, the request to "DirAsst" might immediately be delegated to another respondent such as a station **140**, **142** in system **30**. Sufficient information about the requesting chat client gleaned from the initial chat request may be passed along to a subordinate station which could then engage the requestor. The principal who initiated the request addressed to "DirAsst" might soon receive back a response from "DirAsst45" or "Operator6" or any other screen name corresponding to the assigned station.

These approaches are advantageous for permitting the service provider to maintain any number of stations at any given time, as opposed to having exactly a hundred or a thousand different chat respondents online at all times. Such approaches also allow for dynamic distribution among stations under the control of the service provider.

In accordance with another embodiment of the present invention, multiple (and preferably all) stations **140**, **142** utilize a common CSSN for each distinct service offering (e.g., "Call Services" and "Concierge" from FIG. **2**), so that multiple users of possibly different instant messaging services can concurrently conduct private chat sessions with multiple stations **140**, **142** under a common CSSN. Thus, users are afforded the convenience of a single CSSN to learn and remember for each service offering (or even multiple service offerings), much like the provision of telephone collect call completion services by dialing the telephone number "1-800-COLLECT." In order to support sharing of a CSSN by multiple stations **140**, **142**, the second embodiment includes a session router **32** interposed between chat-based services system **35** and network **20** to distribute chat requests addressed to a single CSSN to multiple stations **140**, **142**. Session router **32** may accomplish the 'conferencing' of multiple chat services and/or stations **140**, **142** into the same chat session. In addition to routing chat requests to chatbots **140** and operator stations **142**, session router **32** can facilitate the transfer of a chat session from one respondent station to another or from one chat-based service to another chat-based service. Session

router **32** may be involved in routing communications to other service providers, such as to a service provider operating a bank of chat respondents similar to SPS **30**. Session router **32** or SPS **30** may also be able to route communications to external resources such as to telephony communications or to a service providing system that is accessible by telephone.

A first party and a second party may address requests to the service providing system, with the request from either party being addressed to a common screen name or other identifier specifying the service providing system. Furthermore, each party accessing the service providing system receives responses that appear to come from the generic screen name by which each party addressed communications to the service. In other words, a first party who initiated communications using a screen name like "Concierge" will receive responses wherein the sender identifier of the message will similarly read "Concierge". Both a first party and a second party using the service will receive responses having the same sender identifier. Both parties will experience communicating with "Concierge" even though they may in fact be conversing with different messaging stations **140**, **142** within service providing system **30**. Session routing process **136** operates on both inbound request messaging and outbound response messaging to accomplish this transparency.

Aside from the transparency experienced by the requestor through chat client **14**, this approach is advantageous for "hiding" the screen names of individual stations and blocking attempts by outsiders to reach a particular station each time they access the system. A novel aspect of session router **32** is that, in contrast to typical IM messaging approaches, it routes inbound messages based on the identification of a chat client **14**, or a party using same, rather than the recipient address contained in the message. Of course, in the scenario just described, all inbound messages will have the same recipient address, namely the CSSN corresponding to SPS **30**. Thus, the choice of which messaging station in chat-based services system **35** receives an inbound message is determined by the session router and not by the party who sent the message.

In the depicted embodiment, session router **32** includes a plurality of agent gateways **134***a-c*, which each provide an interface for a respective instant messaging server **130**. Agent gateways **134***a-c* make transparent the presence of messaging station(s) **140**, **142** providing service to users. It is possible to implement stations **140**, **142** as one or more processes distributed on one or more computing devices, even through geographically distributed systems and/or Web services.

As indicated in FIG. **3**, in order to service a large number of concurrent requests, multiple instances of each type of agent gateway may be instantiated, with load balancing techniques implemented to manage traffic between these instances of each agent gateway **134***a-c*. This approach may be also advantageous in implementations employing geographic redundancy to improve system survivability.

Each gateway **134***a-c* acts as a chat client with respect to a particular instant messaging or presence service. The use of different gateway types is necessitated by the diversity of proprietary instant messaging technologies used by services via servers **130***a-c*. Each service **130***a-c* represents a particular 'brand' of instant messaging service or presence service or combination thereof. There is as yet no common standard by which servers **130***a-c* may interoperate. If and when such interoperability is achieved, alternatively or additionally, a "universal" agent gateway may be implemented to support communication with two or more instant messaging services that employ a common instant messaging protocol. Each agent gateway **134***a-c* translates communication between the instant messaging protocol employed in communication with data processing system **12** via network **20** and a common internal protocol (e.g., IP, a standards-based messaging protocol or a proprietary messaging protocol) employed within service provider system **30** for communication between session router **32** and chat-based services system **35**. Although most chat communication is stateless and unencrypted, the various instant messaging protocols may further require the associated agent gateways **134***a-c* to manage state information and accommodate security implementations, such as encryption, certification, etc.

Session router **32** further includes one or more instances of a session routing process **136** (described in detail below) that routes inbound communication received from agent gateways **134***a-c* to selected stations **140**, **142** for servicing. Session routing process **136** also routes outbound communication received from stations **140**,**142** to the appropriate agent gateway **134***a-c* for transmission to a chat client **14**.

As evidenced by connections **24** and **25** of FIG. **1** and by agent gateways **134***a-c* in FIG. **3**, session router **32** provides a messaging system interface operable to communicate messaging communications among a message response system and parties accessing services provided by the message response system.

Referring now to FIG. **4**, there is depicted an exemplary method by which service provider system **30** registers with one or more instant messaging service providers **103***a-c* to inform them that a chat-based service screen name (CSSN) is online and available to provide service. As indicated at reference numeral **150**, when each station **140**, **142** within chat-based services system **35** becomes available for service, typically on system start up, the station **140**, **142** will register its unique name(s) (e.g., logical name, numerical ID or network address) and its associated CSSN(s) (if more than one CSSN is used) with session routing process **136**.

As part of this registration process, the station may also inform session routing process **136** about its capabilities. The capabilities about which a station may inform session routing process **136** include, for example, languages supported, services provided, concurrent sessions that can be serviced, instant messaging (IM) services and media types supported, service costs, etc. As depicted in FIG. **5**A, session routing process **136** enters this information in fields **164**, **166**, **167** and **168** of a corresponding registration table entry **162** of a registration table **160** (or other data structure) maintained by session routing process **136**. It should be noted that a station may re-register at anytime to inform session routing process **136** of new or changing capabilities, for example, to dynamically update the number of concurrently supported sessions or services that can be provided.

Based upon the registration of stations with the session routing process, a particular messaging station may be selected to be associated with a given party who is communicating with the service providing system. This selection may take into account, for example, availability information relating to availability of the messaging station as reported to the session router, activity level of the messaging station, suitability of the messaging station to communicate with the party, resources available to the messaging station, capabilities of the messaging station, prearranged association of the messaging station with the party, and an attribute of the party meeting criteria for being handled by the messaging station. The prearranged association may relate to providing personalized services as described earlier in conjunction with FIG. **2**. Furthermore, some of the criteria or suitability aspects may relate, for example, to which language a party wishes to use and which stations are able to converse in the desired language. Some criteria or suitability aspects may relate to gen-

der, personality, personal attributes or preferences on the part of the party being serviced or the respondent. This may even extend to the willingness of the respondent at a messaging station to engage in certain types of interactions or services.

Availability status of each station **140**, **142** may be presented in status information field **167** of entries **162** in registration table **160**. For example, the values in this field may represent that a given station is available for handling new sessions, is unavailable or is fully occupied with handling sessions. This information, along with information in capabilities field **166**, may be used in deciding how to allocate stations to handle sessions.

Utilizing fields **167**, **168** of registration table entries **162** within registration table **160** (or other suitable tracking mechanism), session routing process **136** in FIG. **4** preferably tracks which of the one or more CSSNs employed by stations **140**, **142** within chat-based services system **35** are logged into the various available instant messaging services. Alternatively, login status within the various instant messaging services may be maintained by agent gateways **134***a-c* or determined by polling each presence service of servers **130***a-c*. Session routing process **136** may also pass this login status information back to stations **140**, **142** if desirable or required by stations **140**, **142**.

It may be preferable in many implementations to have each station **140**, **142** be able to handle sessions pertaining to multiple CSSNs. A stations may be able to support agility among multiple CSSNs or may even be able to concurrently handle sessions arising from multiple CSSNs. It is particularly noteworthy that each station may also be able to conduct sessions with multiple parties who are accessing the service using different ones of instant messaging services **130***a-c*. Moreover, by virtue of session routing process **136** resolving session identification based on both chat client address **173** and CSSN **174** in table **170**, a given party accessing the system may be simultaneously serviced by one or more stations **140**, **142**. For example, a principal may use two different services accessed using two different CSSNs, yet within the service providing system the sessions are routed independently of one another regardless of the common chat client address. The principal accessing the service may not be aware that both sessions are being serviced by the same service providing system or perhaps even the same respondent station.

When session routing process **136** determines that a CSSN utilized by a station **140**, **142** is registering with session routing process **136** and is not currently logged into an instant messaging service, session routing process **136** sends a login request to the associated agent gateways **134***a-c*, as indicated at reference numeral **152** of FIG. **4**. Generally, in response to one or more stations indicating availability to agent gateways **134***a-c*, the agent gateways **134***a-c*, utilizing the appropriate protocol(s), will each log in to their respective instant messaging services using the CSSN(s) for which the service provider is then receptive to sessions from users. This action is depicted at reference numeral **154**. In embodiments in which more than one instance of an agent gateway **134***a-c* is provided for at least one instant messaging service, it is preferable that only one instance of a particular agent gateway **134** (e.g., selected by default or arbitration) logs a CSSN into the associated instant messaging service. Otherwise, a login attempt may fail or cause the instant messaging service to disconnect a previously logged in agent gateway **134** sharing the same CSSN for that instant messaging service.

With reference now to FIG. **6**, there is depicted an exemplary chat message flow by which a principal associated with chat client **14** can access a chat-based service provided by service provider system **30** in accordance with the present invention. In order to access a chat-based service, the principal associated with chat client **14** will first need to learn the CSSN associated with the desired service. For example, as illustrated in FIG. **2**, the CSSN "Call Services" could be assigned to a chat-based service providing directory assistance, call completion, and other related services, and the CSSN "Concierge" could be assigned to chat-based concierge services (e.g., providing accommodation and restaurant reservations). As noted above, and as shown generally at reference numeral **180**, the principal can learn the CSSN of a desired service by consulting global CSSN directory **132** or other directories, accessing a default entry in friends list **120**, receiving an advertisement, selecting a web site link, etc. For example, a service provider may use television, radio, web banners, billboards or the like to advertise a screen name for users to access a particular service. Ideally, enhancements to existing web-based directory services and/or global CSSN directory **132** might incorporate features to enable the lookup of CSSNs based upon criteria such as service category, service provider, cost, user ratings, etc.

The principal then initiates chat communications with the CSSN associated with the desired service, for example, by selecting a CSSN from friends list **120** and then selecting chat button **112** within messenger window **100** of FIG. **2**. As indicated in FIG. **6**, chat client **14** responds to the principal initiating a chat session by sending a session request **182** to the presence service **130** of the instant messaging service configured for chat client **14**. If the presence service **130** indicates that the CSSN is logged into the presence service **130**, for example, by returning a network address associated with the CSSN, chat client **14** will send a text or voice chat request **184** to the network address returned by the presence service. The address associated with the CSSN will direct the chat request to the appropriate agent gateway **134** within session router **32**. For example, if the user has an AIM chat client, the chat request may be directed to AIM agent gateway **134***a*. As mentioned before, some instant messaging systems handle all messaging traffic whereas others merely participate in the initial establishment of messaging sessions. Still others operate in an entirely peer-to-peer fashion without involving intermediary messaging servers. Those of ordinary skill in the art will recognize that the present invention may be embodied in the context of any of these forms of messaging systems. For example, in homogeneous environment where a single messaging system or messaging protocol is to be supported, such as in a private enterprise, some of the elements and practices described herein may be omitted or suitably modified.

As discussed above, in response to receipt of chat request **184**, agent gateway **134** may optionally translate chat request **184** into a translated chat request that complies with the internal messaging protocol employed by service provider system **30**, and session routing process **136** routes the translated chat request to one or more stations **140**, **142** for servicing, as generally indicated at reference numeral **188**. As discussed above, the provided service may be any of a myriad of services, and will typically entail the transmission of a text or voice chat response message from a station (e.g., chatbot-**1** **140**) to chat client **14**, as indicated at reference numerals **190** and **186**. This chat response message may convey information sought by the chat request (e.g., a telephone number, chat screen name or other contact information) or may convey acknowledgement (completion) or refusal of the chat request. It should also be noted that the chat response may be in a different format than the chat request (e.g., a text chat response to a voice chat request).

To determine how to route inbound messaging to respondent stations **140**, **142** and route responses to appropriate agent gateways **134***a-c*, session routing process **136** may consult routing association function **138** to obtain routing information. Routing association function (RAF) **138** may implement a variety of techniques for establishing an association between a messaging station and a party who is using the service providing system **30**. For example, routing association function **138** may comprise, or have access to, routing table **170** and/or registration table **160**. Routing association function **38** may apply selection criteria to decide which messaging station is to handle each inbound communication session. A routing association manifested in routing association function **138** may act by associating an identifier for a party with a messaging station identifier. An identifier for a party may be, for example, a screen name by which the first party is known in an instant messaging system, a network address for a messaging client used by the first party, an account name, an account number, and a user name by which the first party is known to the messaging response system. Routing association function **138** may comprise any or all of: a data structure for storing routing associations, a process for determining routing associations and means for accessing routing association information from another source.

In some cases, session routing process **136** may also transfer a chat session to another station or "conference in" an additional station (e.g., Oper-**1** station **142**) to service the chat request, as generally illustrated at reference numeral **192** and as discussed further below. To facilitate the servicing of chat requests by multiple stations sequentially or concurrently, session routing process **136** and/or stations **140**,**142** will maintain enough state information for each chat session within database **144** so that any session can be transparently transferred to another station **140**, **142** at any point during the chat session. The need to transfer the session could arise due to system failures, load balancing, requests for functionality not offered by the current station, etc. One common reason to transfer control of a chat session may be the need for chatbot **140** to invoke service by a human-assisted station **142**. Such transfer, as well as addition or deletion or other changes to routing, may be initiated by chatbot **140**, by the user at chat client **14**, by an operator at a human-assisted station **142**, or under programmed control of some nature operating within system **30** or chat-based services system **35**. Another possible participant in the transfer, conferencing or control may be a third party associated with SPS **30**, such as a supervisor at a supervisory station therein. Transfer or conferencing may also involve a party outside of SPS **30**, such as another service providing system similar to SPS **30** or even a call center, operator or help desk which are accessible by telephone. Conferencing, transfer or referral involving a telephone-accessible entity may be accomplished via, for example, connections **56** and **71** shown in FIG. **1**.

Session routing process **136**, for example by the action of routing association function **138**, may be caused to add another station by creating multiple routing association records **172** mapped to the same chat client address **173**. Deleting a routing association corresponds to deleting a record **172** within routing table **172**. Reassigning a different messaging station to handle requests from a given party (such as when human operator intervenes and replaces an automatic respondent during a session) may be accomplished by adding a routing association in the form of a new record **172** and then deleting the former routing association record.

It should be noted for the sake of clarity that instant messaging sessions are typically stateless interactions. Elements involved in handling messaging communications generally do not maintain state information. For example, delivering a given message does not depend upon the messaging system recalling any information related to previous messages having been sent. The concept of session state information described herein does not imply any change to the stateless nature of conventional chat sessions from the perspective of chat clients and instant messaging services, nor does it exclude a modification of instant messaging to include notions of state.

In some instances, it may be desirable to provide for storage of session information. This may be useful for conveying information from one station to another as a session is transferred. This may be also useful for sustaining a session even if a service within service providing system **30** is momentarily disrupted. Examples of session information to be stored may include an identifier associated with a party, state information related to the communications session with the party, degree of progress through a programmatic sequence of steps performed by the messaging response system, copies of at least portions of messaging communications, information obtained from the party, information requested by the party, information pertaining to the party, information obtained from a database responsive to communications with the party, information pertaining to a messaging station, and pointers, links, handles, indices and other references to places where additional data may be obtained. These same types of information may also be passed directly between stations with or without being stored in a database. This same information may also be useful for such purposes as billing, fraud prevention and collection of operating statistics.

Referring now to FIG. **7**, there is illustrated a high level logical flowchart of an exemplary method by which the session routing process **136** of FIG. **6** routes communication between agent gateways **134***a-c* and stations within the chat-based services system **135** in accordance with a preferred embodiment of the present invention. In the depicted embodiment, session routing process **136**, which can be implemented in hardware, software or a combination thereof, routes such communication by referring to the routing table **170** shown in FIG. **5**B.

As described earlier, routing table **170** may be generally characterized as a routing association means, with each record therein representing a routing association between a messaging station and a party accessing the chat-accessible services. It is contemplated that a variety of alternative data structures or algorithmic approaches may be used to represent, determine and manipulate such routing associations that cause communications from a party to be routed to a particular messaging respondent station. Process **700** is a method of managing messaging communications and may be implemented as a software process represented by instructions on a computer-readable medium.

In FIG. **7**, process **700** begins at step **701** in response to session routing process **136** receiving a message, such as from an agent gateway **134** or station **140**, **142**. In the depicted embodiment, the internal communication protocol employed within service provider system **30** includes at least three types of messages: chat requests by chat clients **14**, chat responses by stations **140**, **142** and control messages. Upon receipt of a message in step **701**, processing then continues with step **702**, wherein it is determined if the message is a chat request from a chat client **14** received from an agent gateway **134**. If so, then execution proceeds to step **712** to determine if the chat request represents a new session. This determination may involve examining routing table **170** for entries having the same chat client address **173** as the inbound message.

If such an entry is found, signifying that there already exists a session and a station associated with the requesting party, then execution proceeds to step **716** wherein the chat request received in step **701** is matched to one or more entries **172** in routing table **170** based upon preferably both the chat client address and CSSN. Accordingly, the message is then forwarded to the appropriate station(s) as indicated by corresponding servicing station address **176** in routing table **170**. Multiple entries for stations servicing the same chat client address may occur when stations perform conferencing, such as when a human-operated station becomes involved in a chatbot session. After dispatching the chat request to the assigned station, execution of process **700** terminates at step **730** denoting completion of handling the communication that was received in step **701**.

Returning to step **712**, if no entry **172** having a matching chat client address **173** and CSSN is found, then it is assumed that the message represents a new chat client that is not already associated with a session or station in service provider system **30**. In this case, execution proceeds to step **714** to select a station to be assigned to the originating chat client for handling the current request and any subsequent requests. The selection of a particular station from among a pool of stations **140**, **142** may take into account many factors, such as the current workload, current availability and suitability of each station. Session routing process **136** selects from registration table **160** a station **140**, **142** to service the chat request based on one or more factors, such as type of request, service cost, workload balancing, system availability, feature sets, system capabilities, operator skills, etc.

The selection of a particular messaging station from among a pool of stations **140**, **142** may be responsive to at least one of: availability of the messaging station, activity level of the messaging station, suitability of the messaging station to communicate with a given party, resources available to the messaging station, capabilities of the messaging station, prearranged association of the messaging station with the party, and at least one attribute of the party meeting criteria to be handled by the messaging station.

Upon selecting a station in step **714**, the process continues to step **704** wherein a new entry **172** is added to routing table **170**. Session routing process **136** then enters the network address or identifier of the selected servicing station and an assigned session ID into fields **176** and **177**, respectively, of the routing table entry **172**. The chat client address field **173** of the entry is populated with the chat client address of the inbound message. The CSSN corresponding to the chat client is entered into CSSN field **174** of entry **172**. The address or identity of the appropriate servicing agent gateway **134** is recorded in servicing agent gateway field **175**.

These actions accomplish an associating or "binding" of the station with the session and the requesting entity. Thereafter, process **700** continues at step **716** and the chat request received in step **701** is forwarded to the newly associated station based on the updated contents of routing table **170**. The process thereafter terminates at step **730**.

Returning to step **702**, if the message received by session routing process **136** is not a chat request, then execution proceeds to step **706** to determine whether the message is a chat response coming from a station **140**, **142** and intended for a chat client **14**. If the message is a chat response by a station **140**, **142**, the process proceeds to step **708** wherein session routing process **136** accesses routing table **170** and inserts the network (e.g., IP) address of the chat client (and optionally the CSSN) into the chat response, if necessary. Of course, in embodiments in which session routing process **136** passes the network addresses of chat clients to stations **140**, **142** and stations **140**, **142** mirror the chat client addresses in chat responses, session routing process **136** need not insert a chat client network address into the chat response as shown at step **708**. Then, in step **710**, the chat response is routed to the appropriate agent gateway **134**. The agent gateway **134** handling the chat session in turn forwards the chat response to the appropriate chat client **14**.

Optionally, in step **708**, an additional search may be made for other entries **172** having the same chat client information and determining if other stations are in communication with the given chat client. To accomplish a chat conferencing function, a response to be sent to the chat client may also be copied to other stations found by this search. Depending on how this is implemented, such conferencing may or may not be bilateral. In some instances, for example, it may be desirable to suppress messages from a human operator **142** echoing to a chatbot **140**.

Returning to step **706**, in the event that the message received by session routing process **136** is not a chat request or chat response, the process proceeds to step **720** and subsequent steps which depict session routing process **136** processing a control message. In the depicted embodiment, such control messages include at least requests by stations to reassign chat sessions to different stations and end-of-session notifications. As indicated by step **718** labeled "Other Processing", the communication protocol involving session routing process **136** may also include other control messages or chat messages not explicitly described herein.

If, in step **720**, it is determined that a received control message is a request to reassign or transfer the session to another station, the process proceeds to step **722**. At step **722**, session routing process **136** responds to the session reassignment request, which may arise as stations refer requests to other stations based upon, for example, appropriate capabilities determined from registration table **160**. It is foreseeable that transfer between human-assisted stations **140** and automated stations **142** may occur fairly often. Dynamic transfer among stations may also be done for load balancing purposes. Session routing process **136** updates entry field **176** of the routing table entry **172** for the chat session with the new servicing station address, and passes the session ID of the chat session to the new servicing station. Based upon the session ID and the session state maintained within database **144** in association with the session ID, the new servicing station can seamlessly (i.e., without any indication to chat client **14** or the principal) deliver service within the chat session beginning from the most recent state.

For example, a principal could be involved in a chat session with a chatbot **140** and then require the assistance of a human operator. The principal or the chatbot **140** could request that the chat session be transferred to a human-assisted station **142**. In response, session routing process **136** can transfer the session to the human-assisted station **142** (and possibly later transfer the chat session back to a chatbot **140**) or join a human-assisted station **142** into the current chat session. After accomplishing the reassignment in step **722**, the process terminates at step **730**.

Referring now to step **724**, if a control message received by session routing process **136** from a station **140**, **142** is an end-of-session notification, process **700** moves to step **726**. Step **726** illustrates session routing process **136** updating routing table **170** to remove routing table entries **172** corresponding to the terminated chat session. Thereafter, the process terminates at step **730**.

If none of the conditions tested by steps **702**, **706**, **720** or **724** are true, then execution proceeds at step **718** to handle

any other form of message that may be received. After any necessary processing is performed in step **718** then process **700** concludes at step **730**.

With reference now to FIG. **8**A, there is illustrated a message flow diagram of an exemplary communication flow by which a chat client accesses chat-based call completion services within communication system **10** of FIG. **1** in accordance with the present invention. It should be understood that many variations are possible in the way that elements of FIG. **1** might communicate to accomplish service functions in accordance with the present invention. As shown, chat client **14** initiates access to chat-based call completion services by transmitting a voice or text Chat Session Request **250**, for example, in response to an associated human principal selecting the CSSN "Call Services" **124***a* and chat button **112** within messenger window **100** of FIG. **2**. In response to receipt of Chat Session Request **250**, service provider system **30** routes Chat Session Request **250** to a particular station **140**, **142**, which responds with a Chat Response **251** indicating that a chat session has been successfully established. For example, Chat Response **251** may be a voice or text chat message stating, "Welcome to Chat Call Services. How may I assist you?"

Chat client **14** may then follow with text or voice Chat Request **252**, which may be a request for information, such as contact information for another party. A station **140**, **142** may find the requested information and then return an answer **254** to the requesting chat client **14**. Optionally, the fulfillment of the request may incur a charge to be billed to the requestor or some other party. Accordingly, billing system **40** may be notified of the fulfillment of the request by message **253** which may carried along connection **42**. In some implementations, billing system **40** may be consulted as part of a determination of whether a request should be fulfilled based upon the ability to obtain payment for fulfilling the request. This type of authorization role is represented by message **253***a* and may entail billing system **40** verifying whether a valid account exists and a balance is sufficient to accommodate the charges associated with fulfillment of requests. In response to message **253***a*, it is possible that service provider system **30** selectively performs further steps, such as responding via message **254**, responsive to whether or not billing system **40** authorizes the providing of services. Those of ordinary skill will recognize that billing system **40** may be notified of usage or may be consulted for authorization at a number of junctures depicted in FIGS. **8**A-**8**B. Billable usage may be assessed for various aspects of service fulfillment, as will be further described herein in conjunction with FIG. **9**.

In FIG. **8**A, the information provided in message **254** may satisfy the immediate needs of the requesting party or principal using chat client **14**. The chat session with service provider system **30** may then be terminated expressly by either the principal or the service provider or may simply be terminated automatically after a period of inactivity, for example.

Alternatively, the principal using chat client **14** may desire to immediately initiate communications with a party for which the service provider has found contact information. Chat client **14** may send a call completion request **255** to service provider system **30** to request that a party be contacted via service provider system **30** and other components of system **10**.

Upon receipt of a Call Completion Request **255**, service provider system **30** may communicate instructions, via Call Setup Request **256**, to intelligent chat gateway **52** to begin the process of setting up communications between the requesting principal and another party. Although not explicitly shown, the proceeding with call setup in this manner may be preceded by having billing system **40** verify that such call setup is permissible based upon, for example, applicable charges being billable to an account.

Call Setup Request **256** might contain, for example, a request to establish a connection with a specified terminating telephone number (e.g., 319-123-4567). Other information, such as a preferred mode of payment (e.g., credit card, calling card, collect, etc.), may also be included within the request or implied by the access mode. In order to provide the requested call completion service, the serving station **140**, **142** within service provider system **30** sends a Call Setup Request **256** to intelligent chat gateway **52**. Call Setup Request **256** may include the chat client type (AIM, Yahoo!®, Messenger, MSN® Messenger, etc), the network (e.g., IP) address of chat client **14**, the terminating telephone number, and optionally other capabilities of chat client **14**.

In response to receipt of Call Setup Request **256**, intelligent chat gateway **52** directs VoIP gateway **54** to establish communication with chat client **14** over network **20** and then establish communication with telephone **62** over PSTN **60**. For example, to initiate communication between VoIP gateway **54** and chat client **14**, intelligent chat gateway **52** transmits to VoIP gateway **54** a Call Setup Request **258** including at least the network address of chat client **14**, and optionally, other information such as an indication of a data network signaling protocol for the call (e.g., Session Initiation Protocol (SIP), H.323, CCS7, etc.), a billing identifier or method, etc. In some embodiments, Call Setup Request **258** may provide all the information needed by VoIP gateway **54** to establish VoIP communication with chat client **14**. In other embodiments, VoIP gateway **54** may obtain additional information regarding chat client **14** directly from the instant message server **22** providing instant messaging service to chat client **14**, as shown in FIG. **1** at reference numeral **55**.

VoIP gateway **54** responds to Call Setup Request **258** by transmitting a Call Setup message **260** to chat client **14** over network **20** utilizing a selected signaling protocol (e.g., SIP, H.323, or CCS7). Chat client **14** responds to Call Setup message **260** by transmitting an Acknowledgement message **262** indicating its availability for the call. VoIP gateway **54** then informs intelligent chat gateway **52** of successful call setup with chat client **14** by sending Call Chat Done message **270**. In response to successful call setup with chat client **14**, intelligent chat gateway **52** then directs VoIP gateway **54** by Call Terminating Phone message **272** to perform call setup for telephone **62** over PSTN **60**.

In response to receipt of Call Terminating Phone message **272**, VoIP gateway **54** sends Call Setup Request **274** to telephone **62** over PSTN **60**, for example. Utilizing Integrated Services Digital Network (ISDN), SS7, feature group D (FGD) or other telephony signaling protocol along a signaling connection **58**, a bearer connection **59** is established involving PSTN **60** and connecting ultimately to telephone **62**. VoIP gateway **54** notifies intelligent chat gateway **52** of call setup request **274** with Call Terminating Phone Done message **280**. Call Setup Request **274** effects ringing of telephone **62**. When telephone **62** is answered, for example, by a human or automated attendant taking telephone **62** off-hook, VoIP gateway **54** detects the telephone **62** going off-hook, as indicated at reference numeral **282**, and connects telephone **62** with chat client **14** to complete the call, as indicated at reference numeral **284**. Optionally, where charges are incurred for the call, a message **286** may be sent to billing system **40**, such as along connection **41**, to establish a starting time for the billable call and begin the accumulation of charges based on call duration. For the duration of the call, telephone **62** sends and receives voice communication **292** to

and from VoIP gateway **54** over PSTN **60**, and chat client **14** sends and receives a real time protocol (RTP) IP voice stream **290** to and from VoIP gateway **54** over network **20** independently of intelligent chat gateway **52** and service provider system **30**. Alternatively, the communications established could be voice-enabled chat (e.g. sound bites) or could involve translation through IMT **70**. Upon VoIP gateway **54** detecting termination of the call leg with telephone **62**, VoIP gateway **54** notifies chat client **14** that the call is over with Done message **294**. VoIP gateway **54** may also send message **296** to billing system **40** to signify that the call has ended and that accumulation of charges may cease.

With reference now to FIG. **8**B, a process is depicted by which call completion requested by a principal may result in a "chat-to-telephone" connection by involving IMT **70**. Many of the same steps shown in FIG. **8**A, such as the initial request for contact information and the messaging to billing system **40**, are applicable to this scenario but are omitted for the sake of clarity.

Call request **455** from chat client **14** is comparable to call request **255** as was shown and described in FIG. **8**A. Upon receiving such request, and perhaps checking billing status for the party making the request, a call setup request **456** is sent to intelligent chat gateway **52** to begin the process of making three connections, namely:

a. a text chat session between IMT **70** and chat client **14**,

b. an RTP or comparable voice connection between gateway **54** and IMT **70**,

c. a voice connection through telephone network **60** between gateway **54** and phone **62**.

As one way of accomplishing these connections, gateway **52** might then send a translator setup message **458** to IMT **70** instructing the latter to allocate processing resources (modules **72**, **74**) to be assigned to the new connection. Translator setup message **458** may convey information, such as network address or screen name for chat client **14**, so that IMT **70** may then establish a chat session with chat client **14**. The ensuing chat messaging, presented by connections **76**, **77** may actually be carried within network **20** and may be partly or fully conducted through IM service **22**. To initiate communications, IMT **70** may send one or more initial messages **460** to chat client **14**. Chat client **14** may respond with message(s) **462** whereupon IMT **70** and chat client **14** are in successful communication. Optionally, IMT **70** may acknowledge with a call progress message **464** of sorts saying something like "Connecting. . . . Please wait." Meanwhile, IMT **70** reports back to intelligent chat gateway **52**, via message **466**, that the translator-to-chat client connection has been successfully made.

Next, intelligent chat gateway **52** may instruct VoIP gateway **54** to initiate a packet voice connection, such as a two-way RTP connection, with IMT **70**. Messages **470**, **472** represent the formation of an RTP connections **75**, **78**. IMT **70** may have to provide an address and/or port number, perhaps carried through messages **466** and **468**, so that the resulting RTP connection is properly matched to the instances of modules **72**, **74** that are prepared to handle translations involving the particular chat client **14**. Alternatively, both IMT **70** and gateway **54** may negotiate using some sort of session ID passed in the various messages to ensure proper mapping of voice and chat connections. Once the RTP connection between IMT **70** and gateway **54** is successfully established, gateway **54** reports the status of the connection to intelligent chat gateway **52** using message **474**. Intelligent chat gateway **52** may then instruct VoIP gateway **54**, via message **476**, to originate a telephone call. Message **478**, which accomplishes the calling of phone **62**, may represent telephony signaling such as ISDN, SS7, C7, Feature Group D or other measures to originate a phone call to reach phone **62**, most likely through an intervening network such as the PSTN.

Message **480** represents an acknowledgement that the call is being placed to phone **62** as requested. When phone **62** is answered by a party, a message **482** is received from the telephone network indicating that the called party has gone "off-hook" and is now connectable. Messages **484** and **486** indicate that this occurrence may be reported back to the service provider system **30** to perhaps provide feedback, serve billing purposes, or allow a service provider agent to interact with the called party or the requestor in some fashion. ICG **52** or service provider system **30** may even signal IMT **70** to send out a chat prompt to chat client **14** and an audio message to phone **62** so that the parties become aware that they are connected and that the connection is a chat-voice translated connection. Without some notification of this type, the communicating parties may be confused about what is happening and may even abandon the call without communicating.

Corresponding to the three connections described above, chat traffic **490**, RTP traffic **492** and telephone voice traffic **494** are then carried through their respective networks as the parties communicate.

As described before, the communications among chat client **14** and phone **62** may continue until one or both parties terminate the call. It is also conceivable that, at any time, one of the parties may "roll over" the call to a more convenient form of communication, such as voice-enabled chat.

While a particular sequence of messages have been depicted in FIGS. **8**A and **8**B by way of example, it should be acknowledged that there are many ways to coordinate the formation of the required connections between a principal using chat client **14** and a party using phone **62**.

More generally, in performing any of the functions described herein, there are a number of variations possible in terms of which elements initiate connections or control other elements to carry out the needed functions. It is contemplated that, in an alternative embodiment, other entities, such as service provider system, may dispatch commands to various elements, such as IMT **70**, to coordinate the formation of such connections. For example, IMT **70** might receive instructions from either service provider system **30** or intelligent chat gateway **52** and then autonomously coordinate the forming of chat connections **76**, **77** and RTP connections **75**,**78** and then signaling directly to VoIP gateway **54** to accomplish a telephone call through PSTN **60**. IMT **70** may comprise a controller **73** to communicate with and receive and process instructions from either or both of service provider system **30** or intelligent chat gateway **52** along connections **80** through network **20**.

Controller **73** may, for example, coordinate the allocation of communication ports and processing resources within IMT **70** in response to instructions from other elements.

It is also possible that IMT **70**, via controller **73**, might control other elements to coordinate connections. IMT **70** may instruct intelligent chat gateway **52** to cause VoIP gateway **54** to form an RTP connection addressed to a particular port on IMT **70**. Connections **80** may also represent merely the passage of information, rather than actual commands,

useful for coordinating communications, such as the passage of network address information or screen names.

Under various call scenarios, call coordination could conceivably begin with almost any element and be carried out in almost any sequence. The sequencing of connection formation and sequencing, format and content of messages may vary and yet accomplish the same end result. There are also many ways to convey addresses and other identifiers among elements to ensure accurate connections. The present invention is not intended to be limited by only the particular call flows which are presented here by way of example.

These possibilities give rise to novel and useful elements such as a IMT having a chat interface and having call setup signaling capabilities. Another novel element in accordance with an embodiment of the present invention is system comprising an VoIP gateway which can originate connections in both telephone and packet network domains.

It should be noted that even newer style telephones and telephone systems made to interface directly with a packet network, like the so-called "IP phones" represented by IP phone **92** in FIG. **1**. IP phone **92** represents a type of internet-protocol telephony client and could also be implemented as an application running on a computer. Despite chat client **14** and IP phone **92** both being digital data devices coupled through a data network, users of these devices may still benefit from features of the present invention. A person using IP phone **92** may find it advantageous at times to engage in translated voice-to-chat communications or voice-enabled chat with a chat client **14**. Whereas VoIP gateway **54** is obviated in this scenario, many of the elements interact in much the same way to establish RTP connection with IP phone **92** as will be recognized by those of ordinary skill in the relevant art.

Billing

As described above with reference to FIG. **1**, service provider system **30**, gateway **50**, IM service (IMS) **22** are shown to be coupled to one or more billing systems **40** (illustrated collectively in FIG. **1** for simplicity) in order to bill chat clients **14** for access to at least some chat-based services. The depicted connections **41**,**42**,**43**, coupling gateway **50**, SPS **30** and IMS **22** respectively, represent an approach of providing a billing system interface through which indications of billable activity may be sent to the billing system and authorization to perform requested services may be obtained from the billing system. In some implementations, IMS **22** may represent a private or semi-private messaging system operated to provide a source of revenue or cost recovery. Any of the elements in FIG. **1** may be directly coupled to billing system **40** to engage billing related function or may be indirectly coupled through other elements. Those of ordinary skill in the art will appreciate that billing functions may also be integrated into, or distributed among, elements of system **10** to varying degrees.

In the preceding description of at least FIGS. **1** and **8**A, billing system **40** was shown to participate in collecting information indicative of usage activity in communications system **10** and in authorizing activity based on whether such activity could be paid for in some manner. As exemplified in FIG. **8** at reference numeral **286**, service provider system **30** may provide indication of call completion services to billing system **40** in response to successful call completion (as shown) or in response to initiating call setup by sending Call Setup Request **256**. Alternatively or additionally, as shown at reference numeral **296**, VoIP gateway **54** may give indication to billing system **40**, on behalf of service provider system **30**, that call completion services have been invoked. VoIP gateway **54** may also notify billing system **40** of its own role in carrying the call, perhaps reporting call duration upon completion of the call. As system **10** may interact with and provide services in conjunction with a telephone network, such as PSTN **60**, it should be understood that billing system **40** may also interact with telephone network equipment in pursuit of performing billing functions. For example, telephone network equipment, such as switches or service control points (SCPs) may provide indications of usage upon which billing system **40** may base calculation of usage charges.

It should be noted that various elements in FIG. **1** may report a variety of indications to billing system **40** indicating usage of the system which may be billable. The billing system may note these occurrences and determine charges associated with the usage. Furthermore, as depicted in FIG. **8**A and elsewhere, billing system **40** may also participate in authorization or metering of activity in the system based upon whether a valid account exists to which charges may be applied.

Various elements that provide usage indications need not all be coupled directly to billing system **40**. Some elements may pass along usage information for other elements. Some elements may append usage information to other inter-element communications such as the messages shown in FIG. **8**A-**8**B. For example, in FIG. **1** usage of translation facilities in IMT **70** may be reported to billing system **40** by way of communications between IMT **70** and ICG **52**. ICG **52** may receive usage indications from IMT **70** and append additional information pertaining to usage of gateway **50** before sending the information along to billing system **40**. Thus, elements may combine some types of information to, for example, provide billing system **40** a comprehensive view of a given session. As those of skill in the art will appreciate, the same types of usage indications reported to billing system **40** may also be useful for collecting statistics to facilitate traffic engineering and fraud detection.

Some types of activity or events in the system which are reported to billing system **40** may relate to invocation of certain actions or features for which charges may be applicable. For example, a party using chat client **14** might be charged for each time they contact service provider system **30** or for each time they use the system to retrieve information, to perform an action or to establish communications with a called party. A calling party might also incur fees for having the system map a first identifier, such as a name or an alias, to a second identifier, such as telephone number. The resulting usage charges may be applied to the originating party, the called party or even a third party. An originating party using a chat client **14** may have charges billed to their own telephony-related account even though, via the chat-accessible services offered, they may be engaging in non-telephony activity. The combination of IM service and screen name used by an originating party may be automatically mapped to a billable telephony account by SPS **30**, perhaps by using subscriber database **330** (described below) or the like.

A communicating party might be charged differently for invocation of textual messaging versus voice communications. A party may be charged a fee each time a translator is engaged to enable telephony-to-instant-communications call

completion. A calling party may even be charged for requesting information about the balance on an account.

Other types of activity in the system may relate to quantifying usage of system resources. For example, charges may be applied based upon a time duration of a communications session, a volume of data or traffic handled by the system, or a quantity of translation performed. It is possible that elements such as VoIP gateway **54** or IMT **70** may count a number of packets processed, a number of symbols converted, or monitor elapsed time for a given session and then report this information to billing system **40**.

A third possibility for billable activity in the system relates to options, features and subscribed services. Options or features may relate to, for example, class of service provided by the system or to customizability. In particular, parties using the system might pay extra to control the translator function in ways such as selecting languages to be used during translation, providing support for 'emoticons' or selecting voice characteristics to properly represent the gender or other characteristics of the party who is using textual messaging. Another option that might be billable is automatic notification of balance or charges as a party uses the system. In this third category, it is likely that the billing system mostly serves to authorize activity based upon options selected by the user and/or the status of an account that is to pay for the options.

A novel situation is created in the context of some embodiments of the present invention wherein traffic from multiple different IM services converges in a single platform. At least in FIG. **3**, it is evident that parties may contact service provider system **30** from a variety of instant messaging services **130** and the each party is identified to the system, at least initially, by an instant messaging screen name. For billing and perhaps other purposes, it may be desirable to establish an account that is identified at least partially based upon one's screen name.

A problem arises in that, although screen names are unique within each IM service, there is the likelihood that many screen names assigned to users in a first IM service are identical to screen names assigned to a different users in a second IM service. There is no assurance of screen name uniqueness across all IM services.

In order to enable screen-name-associated accounts, some embodiments of the present invention provide for a novel type of billable account that is resolved by a combination of IM service identifier and screen name. Both identification of an IM service and a particular user, such as by screen name, within that service provide sufficient uniqueness to correctly specify a party from among all parties who may access the system. Combination of these identifiers may also be useful in maintaining and accessing profile information and other data associated with a user account.

Referring now to FIG. **9**, there is illustrated a high-level step diagram of an exemplary embodiment of billing system **40** in accordance with the present invention. In the depicted embodiment, billing system **40** comprises a billing database **320** and a billing interface **310** that creates billing records within billing database **320** in response to billing requests received from service provider system **30** or gateway system **50**. Billing system **40** may be implemented, for example, as one or more server computer systems executing billing interface **310** in software.

Billing database **320** comprises a number of individual databases that each represent a particular method of billing. Each individual database may be implemented by an actual database containing records of accounts or may comprise an interface to an external system, such as a validation system operated by a credit card company. Examples of databases that may exist in billing database **320** are summarized below in Table I.

TABLE I

Database	Description
Pre-paid database 322	User purchases services prior to use and billing system deducts value of services from pre-paid balance
Post-paid database 324	User pays for services after use
Collect database 326	Bills chat-based services to called party's telephony services account
Credit card database 328	Bills chat-based services against user's credit card account
Subscriber database 330	Bills chat-based services to user's chat-based services account
ANI database 332	Bills chat-based services to user's associated telephony services account
Third Party 340	Bills chat-based services to user's account with third party, such as another service provider or commercial entity

As indicated by Other billing database **342** shown in FIG. **9**, the above billing methodologies are not exclusive, but are instead merely illustrative of some of the billing options that may be implemented to receive value in exchange for the provision of chat-based services.

Implementations of billing functionality within the system of FIG. **1** may be logically or physically centralized or distributed or may be integrated to varying degrees into other elements or functions that have been described thus far. The manner in which billing functionality may be implemented and coupled with other elements or integrated with other functions will be further clarified in the following discussion pertaining to FIG. **10**.

Hardware Overview

As will be readily apparent to persons of ordinary skill in the relevant art, any of the functional elements, systems and processes depicted in FIGS. **1** through **10** may be implemented in various ways using, for example, suitably equipped data processing systems or computing environments. Such implementations may comprise hardware, firmware, software, or combinations thereof, to accomplish intended functions in accordance with the teachings of the present invention. For example, any or all of service provider system **30**, session router **32**, IMT **70** and intelligent chat gateway **52**, or functional subsystems depicted therein, may be implemented as processes in a program-controlled computing environment. Processes depicted in FIGS. **7**A through **8**B may be implemented wholly or partially as processing threads occurring within a computer processor under software and/or firmware control. A given process may be implemented in a distributed fashion among multiple physical processors or multiple logical processing threads. A single processor may

participate in implementing multiple instances or multiple types of the processes shown. Any of the functions shown, or the hardware used to implement these functions, may be distributed among remote locations or may be collocated.

It will also be appreciated that connectivity among elements for carrying control signals, telephony-style signaling, SIP signaling, instant communications session establishment, billing-related information, bearer channel signals and messaging traffic and the like, may be accomplished via communications through a network, a shared bus, shared memory resources or by inter-process communications or even combinations or pluralities of these.

Even signals representing telephone audio signals may be conveyed to processing equipment in the form of data through a bus or network. Methods and devices for converting among analog audio signals and digital data are well known and are not explicitly shown in FIG. **1** or FIG. **10**, although it is common that PSTN **60** or gateway **54** are equipped to perform these conversions. Adaptation to external systems, such as a telephone network represented by PSTN **60**, may be accomplished by the use of well-known computer-telephony adapter cards (as those made by Dialogic Communications Corporation), commercially available automatic call distributors (ACDs) and Private Branch Exchange (PBX) equipment.

An exemplary arrangement of computing hardware suitable for implementing functional elements and processes in accordance with the present invention will now be described in conjunction with FIG. **10**, although it should be understood that aspects of the present invention may be embodied in other ways.

FIG. **10** illustrates a computer system **600** upon which an embodiment according to the present invention can be implemented. The computer system **600** includes a bus **601** or other communication mechanism for communicating information and a processor **603** coupled to the bus **601** for processing information. The computer system **600** also includes main memory **605**, such as a random access memory (RAM) or other dynamic storage device, coupled to the bus **601** for storing information and instructions to be executed by the processor **603**. Main memory **605** can also be used for storing temporary variables or other intermediate information during execution of instructions by the processor **603**. The computer system **600** may further include a read only memory (ROM) **607** or other static storage device coupled to the bus **601** for storing static information and instructions for the processor **603**. A storage device **609**, such as a magnetic disk or optical disk, is coupled to the bus **601** for persistently storing information and instructions.

The computer system **600** may be coupled via the bus **601** to a display **611**, such as a cathode ray tube (CRT), liquid crystal display, active matrix display, or plasma display, for displaying information to a computer user. An input device **613**, such as a keyboard including alphanumeric and other keys, is coupled to the bus **601** for communicating information and command selections to the processor **603**. Another type of user input device is a cursor control **615**, such as a mouse, a trackball, or cursor direction keys, for communicating direction information and command selections to the processor **603** and for controlling cursor movement on the display **611**.

According to one embodiment of the invention, call processing is provided by the computer system **600** in response to the processor **603** executing an arrangement of instructions contained in main memory **605**. Such instructions can be read into main memory **605** from another computer-readable medium, such as the storage device **609**. Execution of the arrangement of instructions contained in main memory **605** causes the processor **603** to perform the process steps described herein. One or more processors in a multi-processing arrangement may also be employed to execute the instructions contained in main memory **605**. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions to implement the embodiment of the present invention. Thus, embodiments of the present invention are not limited to any specific combination of hardware circuitry and software.

The computer system **600** also includes a communication interface **617** coupled to bus **601**. The communication interface **617** provides a two-way data communication coupling to a network link **619** connected to a local network **621**. For example, the communication interface **617** may be a digital subscriber line (DSL) card or modem, an integrated services digital network (ISDN) card, a cable modem, a telephone modem, or any other communication interface to provide a data communication connection to a corresponding type of communication line. As another example, communication interface **617** may be a local area network (LAN) card (e.g. for Ethernet™ or an Asynchronous Transfer Model (ATM) network) to provide a data communication connection to a compatible LAN. Wireless links can also be implemented. In any such implementation, communication interface **617** sends and receives electrical, electromagnetic, or optical signals that carry digital data streams representing various types of information. Further, the communication interface **617** can include peripheral interface devices, such as a Universal Serial Bus (USB) interface, a PCMCIA (Personal Computer Memory Card International Association) interface, etc. Although a single communication interface **617** is depicted in FIG. **10**, multiple communication interfaces can also be employed.

The network link **619** typically provides data communication through one or more networks to other data devices. For example, the network link **619** may provide a connection through local network **621** to a host computer **623**, which has connectivity to a network **625** (e.g. a wide area network (WAN) or the global packet data communication network now commonly referred to as the "Internet") or to data equipment operated by a service provider. The local network **621** and the network **625** both use electrical, electromagnetic, or optical signals to convey information and instructions. The signals through the various networks and the signals on the network link **619** and through the communication interface **617**, which communicate digital data with the computer system **600**, are exemplary forms of carrier waves bearing the information and instructions.

The computer system **600** can send messages and receive data, including program code, through the network(s), the network link **619**, and the communication interface **617**. In the Internet example, a server (not shown) might transmit requested code belonging to an application program for implementing an embodiment of the present invention through the network **625**, the local network **621** and the communication interface **617**. The processor **603** may execute the transmitted code while being received and/or store the code in the storage device **609**, or other non-volatile storage for later execution. In this manner, the computer system **600** may obtain application code in the form of a carrier wave.

The term "computer-readable medium" as used herein refers to any medium that participates in providing instructions to the processor **605** for execution. Such a medium may take many forms, including but not limited to non-volatile media, volatile media, and transmission media. Non-volatile media include, for example, optical or magnetic disks, such as the storage device **609**. Volatile media include dynamic

memory, such as main memory **605**. Transmission media include coaxial cables, copper wire, and fiber optics, including the wires that comprise the bus **601**. Transmission media can also take the form of acoustic, optical, or electromagnetic waves, such as those generated during radio frequency (RF) and infrared (IR) data communications. Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a CD-ROM, CDRW, DVD, any other optical medium, punch cards, paper tape, optical mark sheets, any other physical medium with patterns of holes or other optically recognizable indicia, a RAM, a PROM, and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave, or any other medium from which a computer can read.

Various forms of computer-readable media may be involved in providing instructions to a processor for execution. For example, the instructions for carrying out at least part of the present invention may initially be borne on a magnetic disk of a remote computer. In such a scenario, the remote computer loads the instructions into main memory and sends the instructions over a telephone line using a modem. A modem of a local computer system receives the data on the telephone line and uses an infrared transmitter to convert the data to an infrared signal and transmit the infrared signal to a portable computing device, such as a personal digital assistant (PDA) or a laptop. An infrared detector on the portable computing device receives the information and instructions borne by the infrared signal and places the data on a bus. The bus conveys the data to main memory, from which a processor retrieves and executes the instructions. The instructions received by main memory can optionally be stored on storage device either before or after execution by processor.

For example, although aspects of the present invention have been described with respect to computer systems executing software that directs the functions of the present invention, it should be understood that present invention may alternatively be implemented as a program product for use with a data processing system. Programs defining the functions of the present invention can be delivered to a data processing system via a variety of signal-bearing media, which include, without limitation, non-rewritable storage media (e.g., CD-ROM), rewritable storage media (e.g., a floppy diskette or hard disk drive), and communication media, such as digital and analog networks. It should be understood, therefore, that such signal-bearing media, when carrying or encoding computer readable instructions that direct the functions of the present invention, represent alternative embodiments of the present invention.

As has been described, the present invention provides methods, systems and program products by which a service provider system can make one or more service offerings available via chat, or other instant communications, and by which a principal associated with a chat client may access these chat-based services. In at least some embodiments of the present invention, the service provider system includes multiple stations that provide one or more chat-based services under a common CSSN and a session router that distributes chat sessions to the stations for service. The chat-based services may be offered without charge or may be subject to a per-use or per-unit fee that is billed by a billing system coupled to the service provider system. In embodiments of the present invention in which the chat-based service offerings include call completion, the service provider system may be coupled to a gateway system that facilitates voice communication between a chat client and a destination station within a telephony network.

While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A method comprising:

receiving, by a processor, as part of chat-based service, textual information corresponding to an instant messaging session over a data connection;

allocating resources and communication ports for conversion of the textual information into a speech signal;

receiving commands by at least one controller from an intelligent gateway for coordinating connections between the receipt of the textual information and the conversion of the textual information into the speech signal, the at least one controller and the intelligent gateway being remote from each other; and

converting, by the processor, the textual information into the speech signal for transmission over a telephony connection during the instant messaging session,

wherein the received textual information is from a particular person, and the speech signal conveys sex, approximate age, vocal characteristics, inflection, and local dialect of the particular person,

wherein the textual information includes one or more emoticon symbols indicative of emotion, and

wherein the converting includes converting the one or more emoticon symbols into one or more sound effects corresponding to the one or more emoticon symbols.

2. The method of claim **1**, further comprising:

determining that a communicating party has requested the conversion of the textual information.

3. The method of claim **2**, further comprising:

transmitting one or more identifiers; and

interacting with the communicating party to receive the request for the conversion of the textual information.

4. The method of claim **1**, further comprising:

counting at least one of a number of packets processed and a number of symbols converted during the conversion; and

generating a message to inform a billing system of the conversion or the receipt of the textual information.

5. The method of claim **1**, further comprising:

tracking usage charges relating to the conversion or the receipt of the textual information; and

determining whether payment can be obtained for usage charges.

6. An apparatus comprising:

at least one processor; and

at least one memory including computer program code for one or more programs,

the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to perform at least the following,

receive, as part of a chat-based service, textual information corresponding to an instant messaging session over a data connection,

allocate resources and communication ports for conversion of the textual information into a speech signal,

receive commands by at least one controller from an intelligent gateway for coordinating connections

between the receipt of the textual information and the conversion of the textual information into the speech signal, the at least one controller and the intelligent gateway being remote from each other, and

convert the textual information into the speech signal for transmission over a telephony connection during the instant messaging session,

wherein the received textual information is from a particular person, and the speech signal conveys sex, approximate age, vocal characteristics, inflection, and local dialect of the particular person,

wherein the textual information includes one or more emoticon symbols indicative of emotion, and

wherein the converting includes converting the one or more emoticon symbols into one or more sound effects corresponding to the one or more emoticon symbols.

7. The apparatus of claim **6**, wherein the apparatus is further caused to:

determine that a communicating party has requested the conversion of the textual information.

8. The apparatus of claim **7**, wherein the apparatus is further caused to:

transmit one or more identifiers; and

interact with the communicating party to receive the request for the conversion of the textual information.

9. The apparatus of claim **6**, wherein the apparatus is further caused to:

generate a message to inform a billing system of the conversion or the receipt of the textual information.

10. The apparatus of claim **6**, wherein the apparatus is further caused to:

track usage charges relating to the conversion or the receipt of the textual information; and

determine whether payment can be obtained for usage charges.

11. A method comprising:

receiving, by a processor, as part of a chat-based service, a speech signal over a telephone connection;

allocating resources and communication ports for conversion of audio information in the speech signal into textual information

receiving commands by at least one controller from an intelligent gateway for coordinating connections between the receipt of the speech signal and the conversion of the audio information in the speech signal into the textual information, the at least one controller and the intelligent gateway being remote from each other; and

converting, by the processor, the audio information in the speech signal into the textual information, the textual information is associated with an instant messaging session for transmission to an instant messaging application over a data connection,

wherein the received speech signal is from a particular person, and the text information conveys one or more of a screen name, an image or iconic representation, and a sound bite,

wherein the audio information includes information of one or more emotions, and

wherein the converting includes converting the information regarding one or more emotions into one or more symbols corresponding the one or more emotions.

12. The method of claim **11**, further comprising:

determining through the processor, that a communicating party has requested the conversion of the speech signal.

13. The method of claim **12**, further comprising:

transmitting one or more identifiers; and

interacting, by the processor, with the communicating party to receive the request for the conversion of the speech signal.

14. The method of claim **11**, further comprising:

generating, by the processor, a message to inform a billing system of the conversion or the receipt of the speech signal.

15. The method of claim **11**, further comprising:

tracking, through the processor, usage charges relating to the conversion or the receipt of the speech signal; and

determining whether payment can be obtained for usage charges based on the tracking through the processor of the usage charges.

16. An apparatus comprising:

at least one processor; and

at least one memory including computer program code for one or more programs,

the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to perform at least the following,

receive, as part of a chat-based service, a speech signal over a telephone connection,

allocate resources and communication ports for conversion of audio information in the speech signal into textual information,

receive commands by at least one controller from an intelligent gateway for coordinating connections between the receipt of the speech signal and the conversion of the audio information in the speech signal into the textual information, the at least one controller and the intelligent gateway being remote from each other, and

convert the audio information in the speech signal into the textual information, the textual information is associated with an instant messaging session for transmission to an instant messaging application over a data connection,

wherein the received speech signal is from a particular person, and the text information conveys one or more of a screen name, an image or iconic representation, and a sound bite,

wherein the audio information includes information of one or more emotions, and

wherein the converting includes converting the information regarding one or more emotions into one or more symbols corresponding the one or more emotions.

17. The apparatus of claim **16**, wherein the apparatus is further caused to:

determine that a communicating party has requested the conversion of the speech signal.

18. The apparatus of claim **17**, wherein the apparatus is further caused to:

transmit one or more identifiers; and

interact with the communicating party to receive the request for the conversion of the speech signal.

19. The apparatus of claim **16**, further comprising:

generate a message to inform a billing system of the conversion or the receipt of the speech signal.

20. The apparatus of claim **16**, further comprising:

track usage charges relating to the conversion or the receipt of the speech signal; and

determine whether payment can be obtained for usage charges.

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