US 20080043770A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2008/0043770 A1**

Arnoff et al. (43) **Pub. Date: Feb. 21, 2008**

(54) **SUBSTANTIALLY SYNCHRONOUS DEPOSIT OF MESSAGES INTO MULTIPLE COMMUNICATION MODALITIES**

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(21) Appl. No.: **11/854,926**

(22) Filed: **Sep. 13, 2007**

Related U.S. Application Data

(63) Continuation of application No. 10/747,823, filed on Dec. 29, 2003, now Pat. No. 7,274,777.

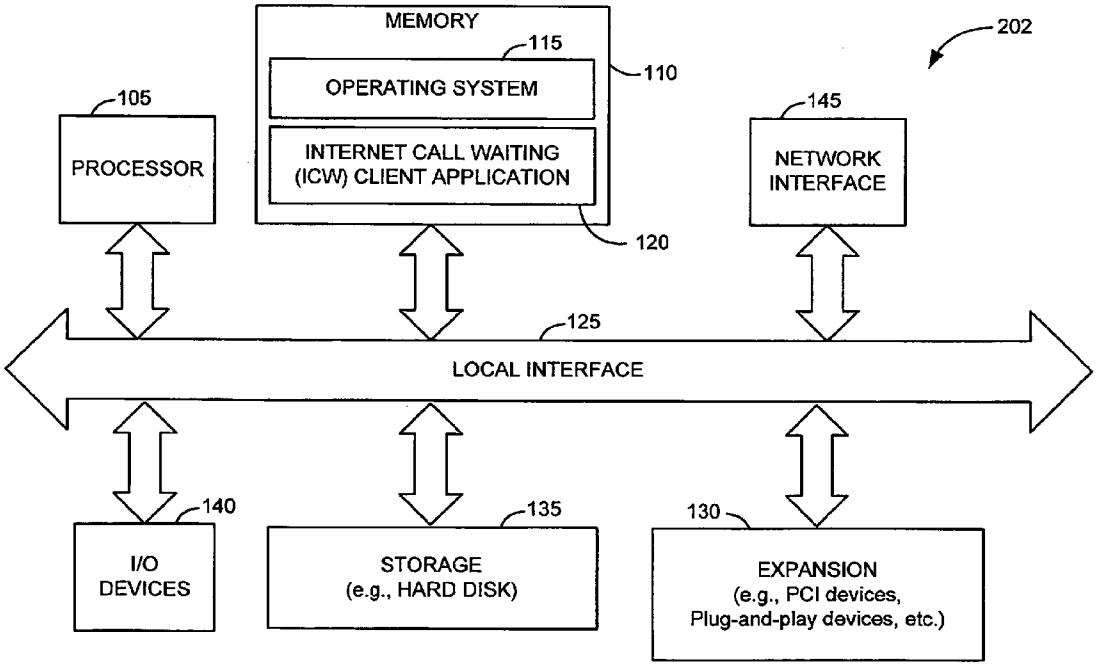
Publication Classification

(51) **Int. Cl.**
H04L 12/54 (2006.01)

(52) **U.S. Cl.** **370/429**

(57) **ABSTRACT**

The present disclosure provides systems and methods for storing messages using multiple communication modalities, in which a first communication is received from a first communication system. One embodiment of a method includes receiving a message in a first protocol and converting the message from the first protocol to the second protocol. Some embodiments include storing the converted message in a temporary mailbox created for storing messages of the second protocol, sending the converted message to a storage component associated with the second protocol, and destroying the temporary mailbox.



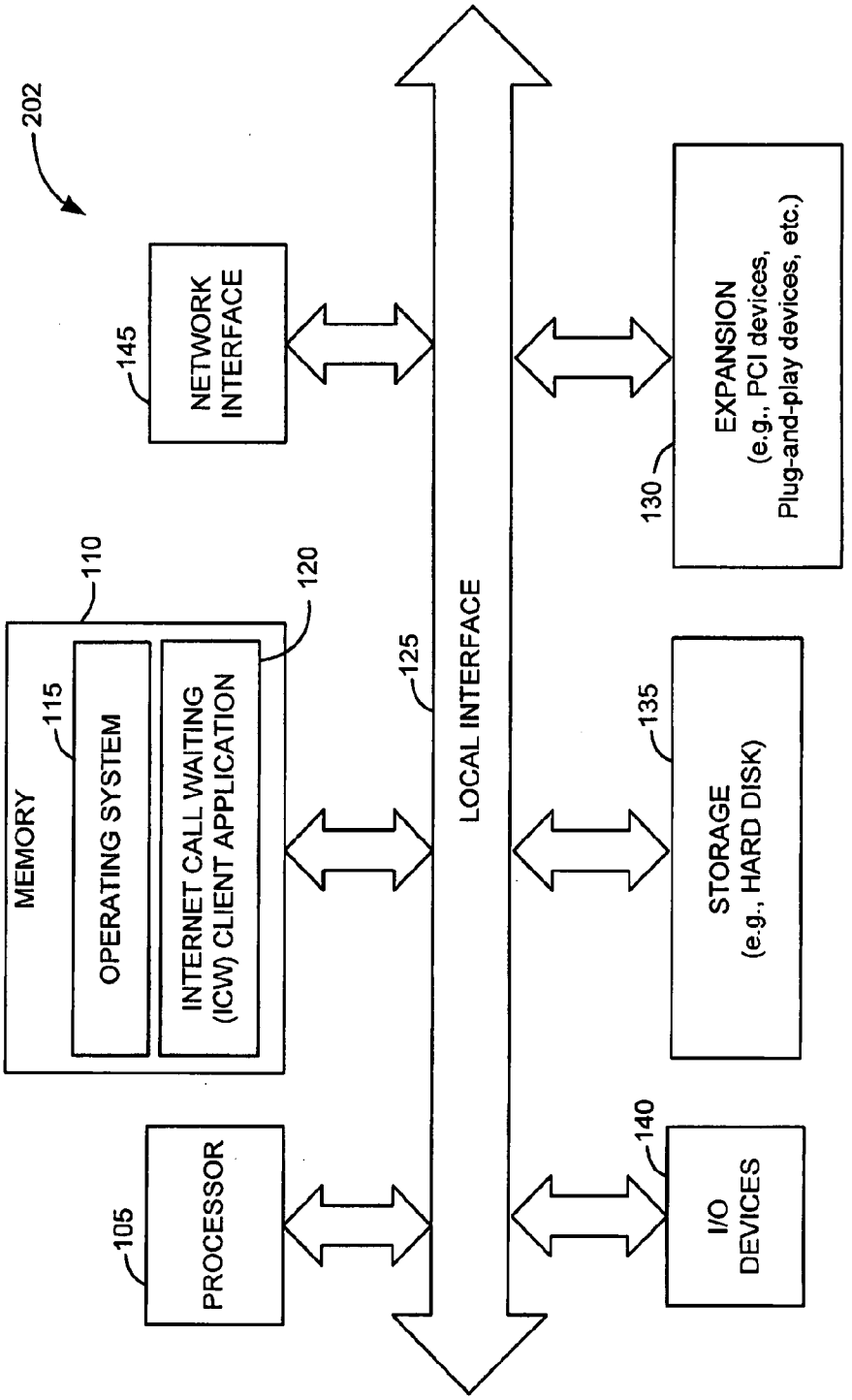

202
NETWORK INTERFACE
145
EXPANSION (e.g., PCI devices, Plug-and-play devices, etc.)
130
110
MEMORY
OPERATING SYSTEM
115
INTERNET CALL WAITING (ICW) CLIENT APPLICATION
120
125
LOCAL INTERFACE
STORAGE (e.g., HARD DISK)
135
PROCESSOR
105
I/O DEVICES
140

FIG. 1

FIG. 2

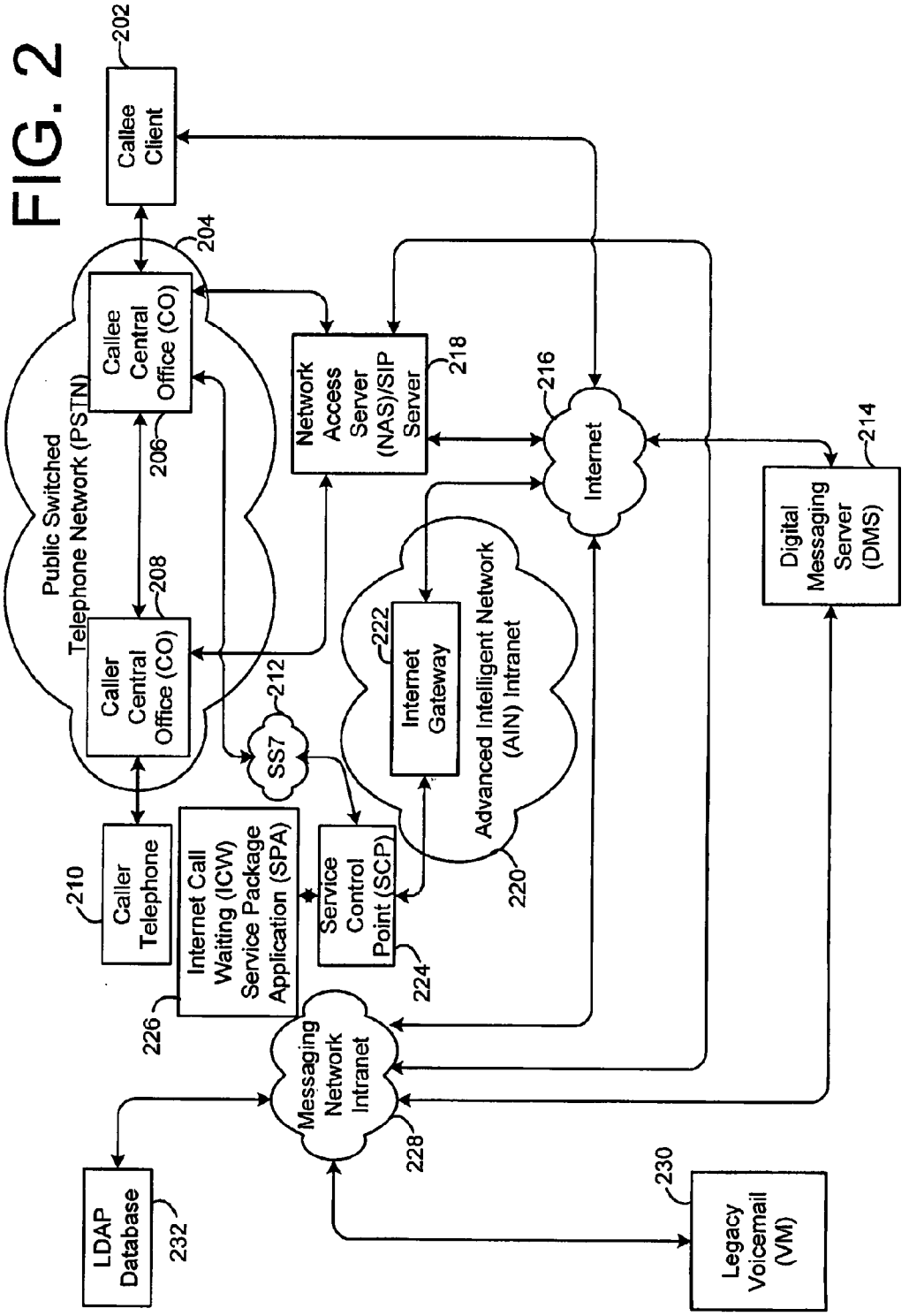
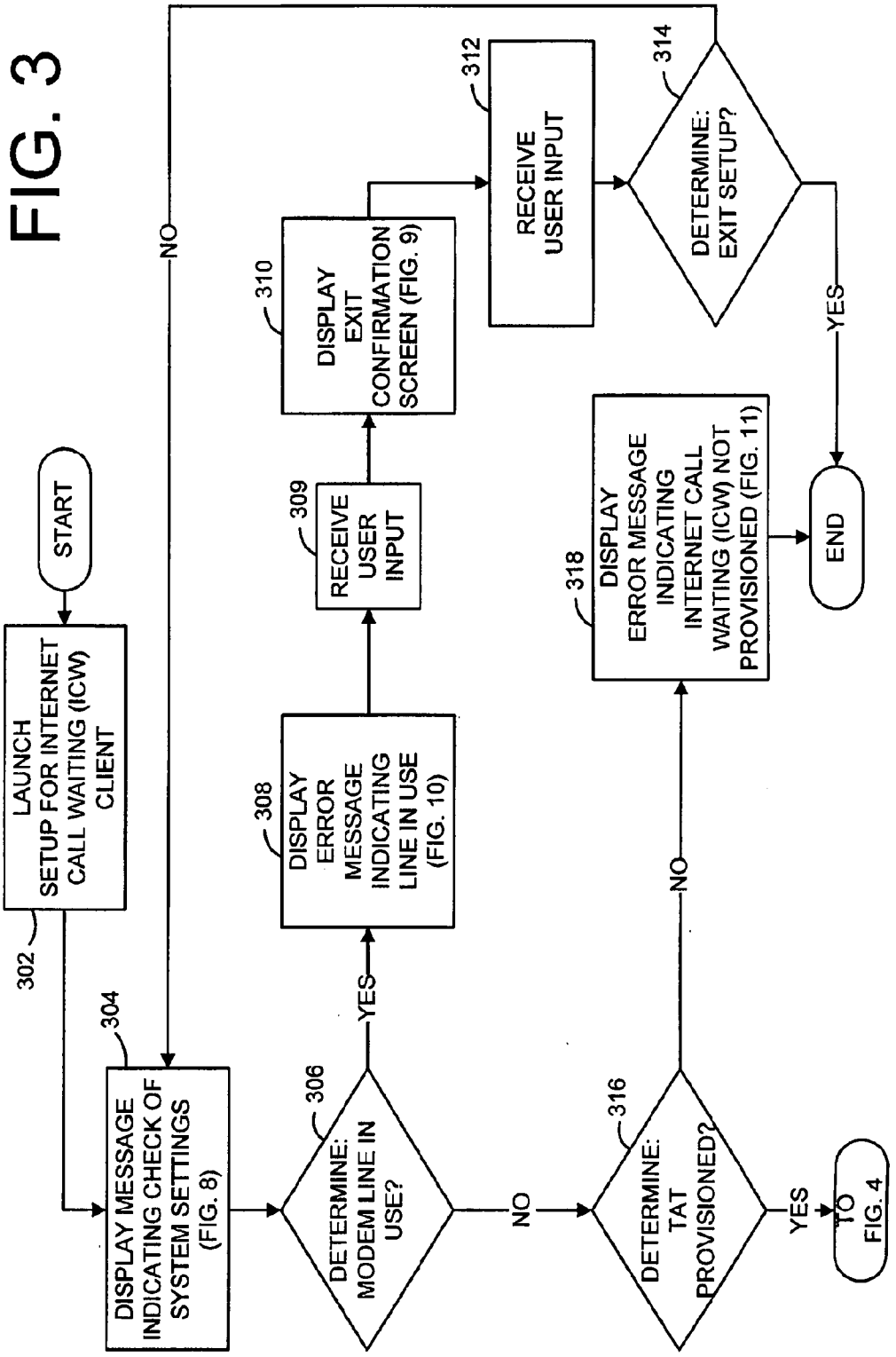

Callee Client
202
Public Switched Telephone Network (PSTN)
204
Callee Central Office (CO)
206
Caller Central Office (CO)
208
Network Access Server (NAS)/SIP Server
218
Internet
216
Digital Messaging Server (DMS)
214
Advanced Intelligent Network (AIN) Intranet
220
Internet Gateway
222
SS7
212
Caller Telephone
210
Internet Call Waiting (ICW) Service Package Application (SPA)
226
Service Control Point (SCP)
224
Messaging Network Intranet
228
LDAP Database
232
Legacy Voicemail (VM)
230

FIG. 3


START
LAUNCH SETUP FOR INTERNET CALL WAITING (ICW) CLIENT
302
DISPLAY MESSAGE INDICATING CHECK OF SYSTEM SETTINGS (FIG. 8)
304
DETERMINE: MODEM LINE IN USE?
306
YES
DISPLAY ERROR MESSAGE INDICATING LINE IN USE (FIG. 10)
308
RECEIVE USER INPUT
309
DISPLAY EXIT CONFIRMATION SCREEN (FIG. 9)
310
RECEIVE USER INPUT
312
DETERMINE: EXIT SETUP?
314
NO
YES
END
NO
DETERMINE: TAT PROVISIONED?
316
NO
DISPLAY ERROR MESSAGE INDICATING INTERNET CALL WAITING (ICW) NOT PROVISIONED (FIG. 11)
318
YES
TO FIG. 4

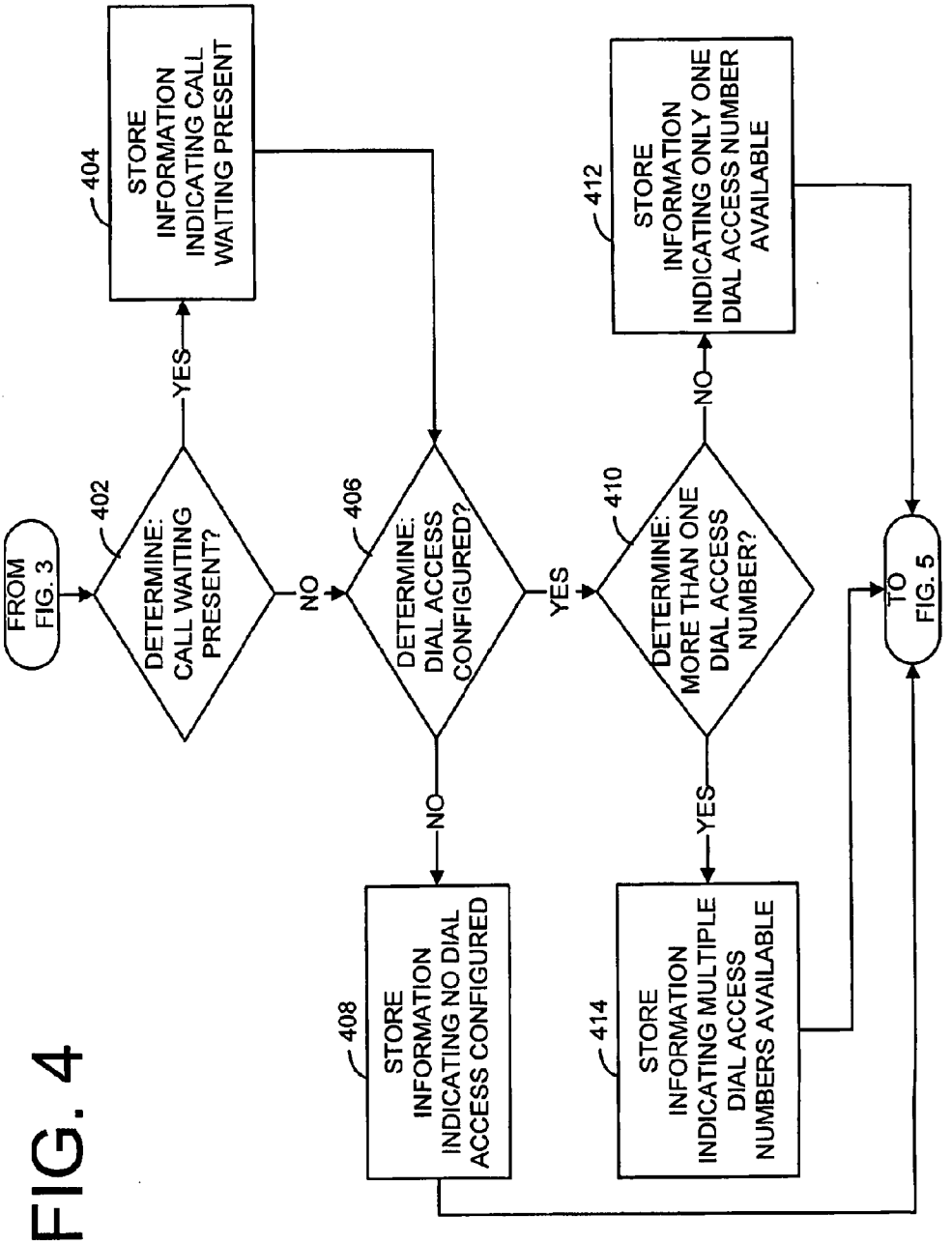
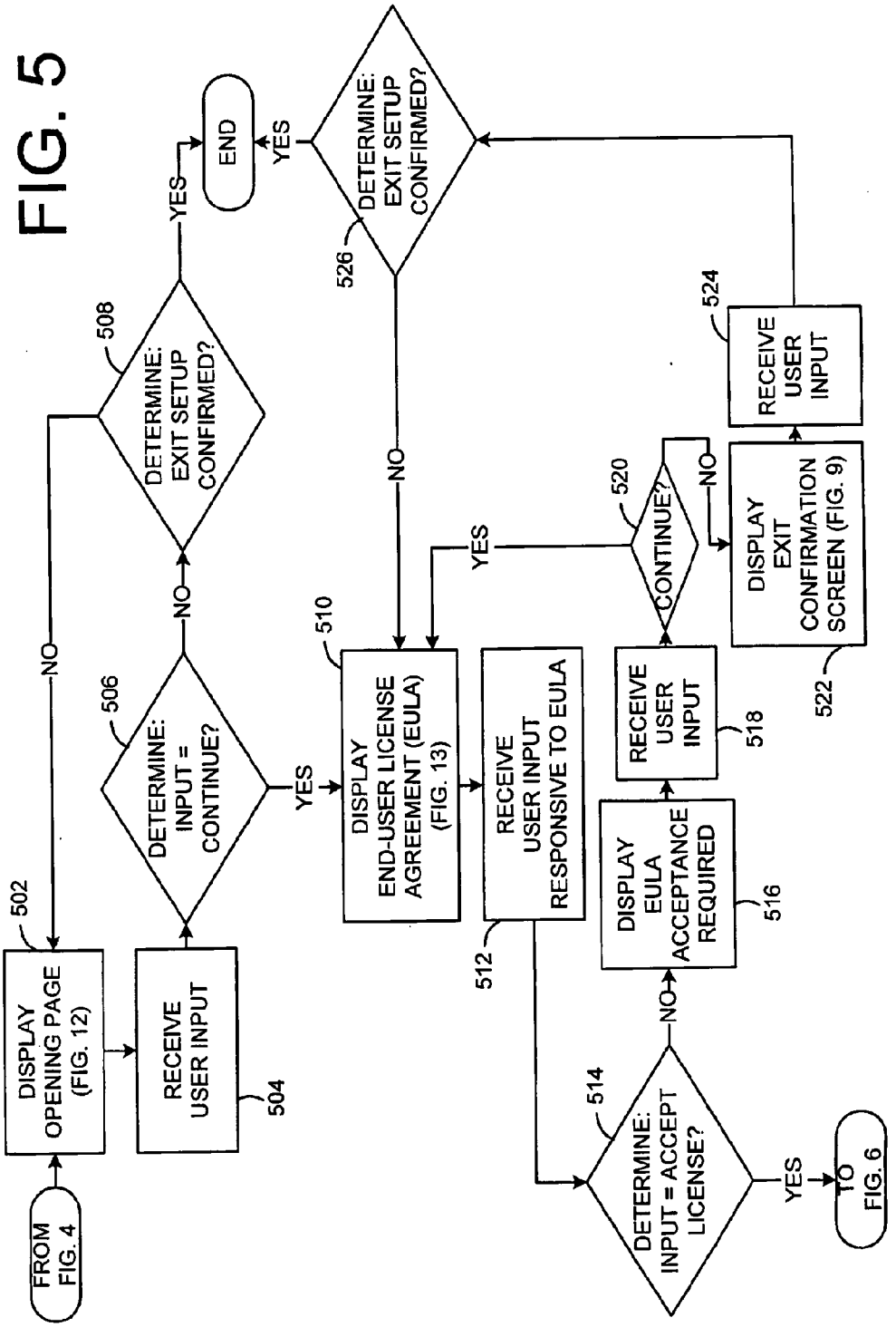

FROM FIG. 3
402
DETERMINE: CALL WAITING PRESENT?
YES
404
STORE INFORMATION INDICATING CALL WAITING PRESENT
NO
406
DETERMINE: DIAL ACCESS CONFIGURED?
NO
408
STORE INFORMATION INDICATING NO DIAL ACCESS CONFIGURED
YES
410
DETERMINE: MORE THAN ONE DIAL ACCESS NUMBER?
NO
412
STORE INFORMATION INDICATING ONLY ONE DIAL ACCESS NUMBER AVAILABLE
YES
414
STORE INFORMATION INDICATING MULTIPLE DIAL ACCESS NUMBERS AVAILABLE
TO FIG. 5

FIG. 4

FIG. 5


FROM FIG. 4
DISPLAY OPENING PAGE (FIG. 12)
502
RECEIVE USER INPUT
504
DETERMINE: INPUT = CONTINUE?
506
DETERMINE: EXIT SETUP CONFIRMED?
508
END
YES
NO
DISPLAY END-USER LICENSE AGREEMENT (EULA) (FIG. 13)
510
RECEIVE USER INPUT RESPONSIVE TO EULA
512
DISPLAY EULA ACCEPTANCE REQUIRED
516
RECEIVE USER INPUT
518
CONTINUE?
520
DISPLAY EXIT CONFIRMATION SCREEN (FIG. 9)
522
RECEIVE USER INPUT
524
DETERMINE: EXIT SETUP CONFIRMED?
526
DETERMINE: INPUT = ACCEPT LICENSE?
514
TO FIG. 6

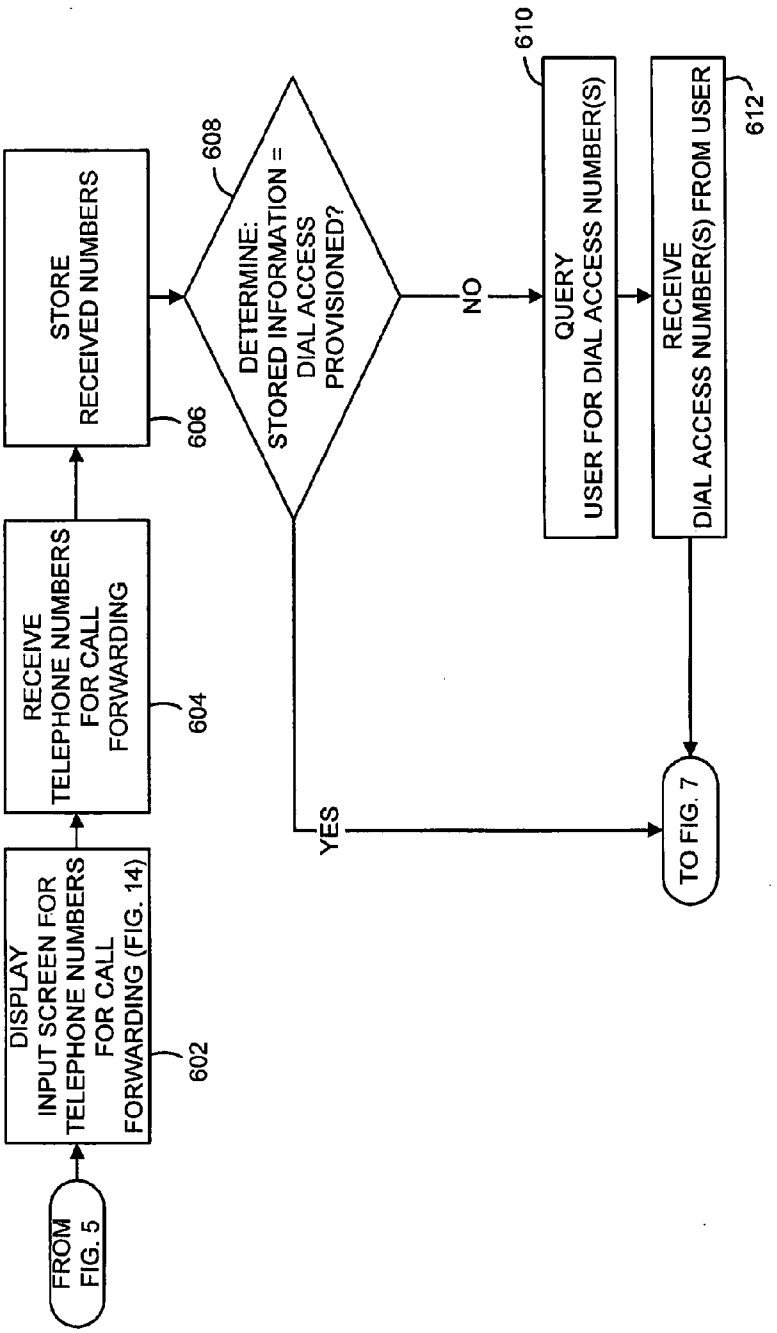

FROM FIG. 5
DISPLAY INPUT SCREEN FOR TELEPHONE NUMBERS FOR CALL FORWARDING (FIG. 14)
602
RECEIVE TELEPHONE NUMBERS FOR CALL FORWARDING
604
STORE RECEIVED NUMBERS
606
DETERMINE: STORED INFORMATION = DIAL ACCESS PROVISIONED?
608
NO
610
QUERY USER FOR DIAL ACCESS NUMBER(S)
RECEIVE DIAL ACCESS NUMBER(S) FROM USER
612
YES
TO FIG. 7

FIG. 6

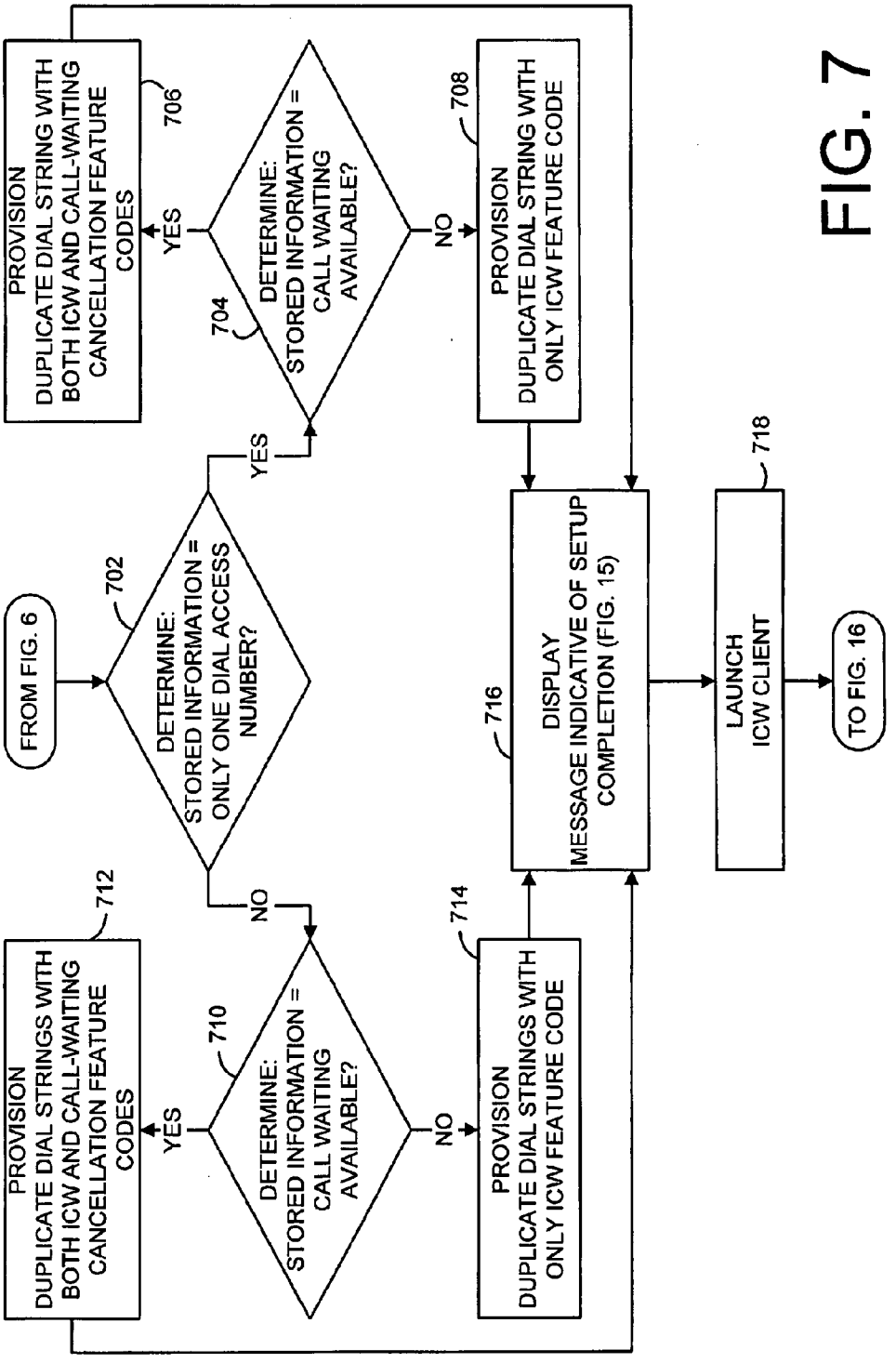

FROM FIG. 6
DETERMINE: STORED INFORMATION = ONLY ONE DIAL ACCESS NUMBER?
702
YES
NO
DETERMINE: STORED INFORMATION = CALL WAITING AVAILABLE?
704
YES
NO
PROVISION DUPLICATE DIAL STRING WITH BOTH ICW AND CALL-WAITING CANCELLATION FEATURE CODES
706
PROVISION DUPLICATE DIAL STRING WITH ONLY ICW FEATURE CODE
708
DETERMINE: STORED INFORMATION = CALL WAITING AVAILABLE?
710
YES
NO
PROVISION DUPLICATE DIAL STRINGS WITH BOTH ICW AND CALL-WAITING CANCELLATION FEATURE CODES
712
PROVISION DUPLICATE DIAL STRINGS WITH ONLY ICW FEATURE CODE
714
DISPLAY MESSAGE INDICATIVE OF SETUP COMPLETION (FIG. 15)
716
LAUNCH ICW CLIENT
718
TO FIG. 16

FIG. 7

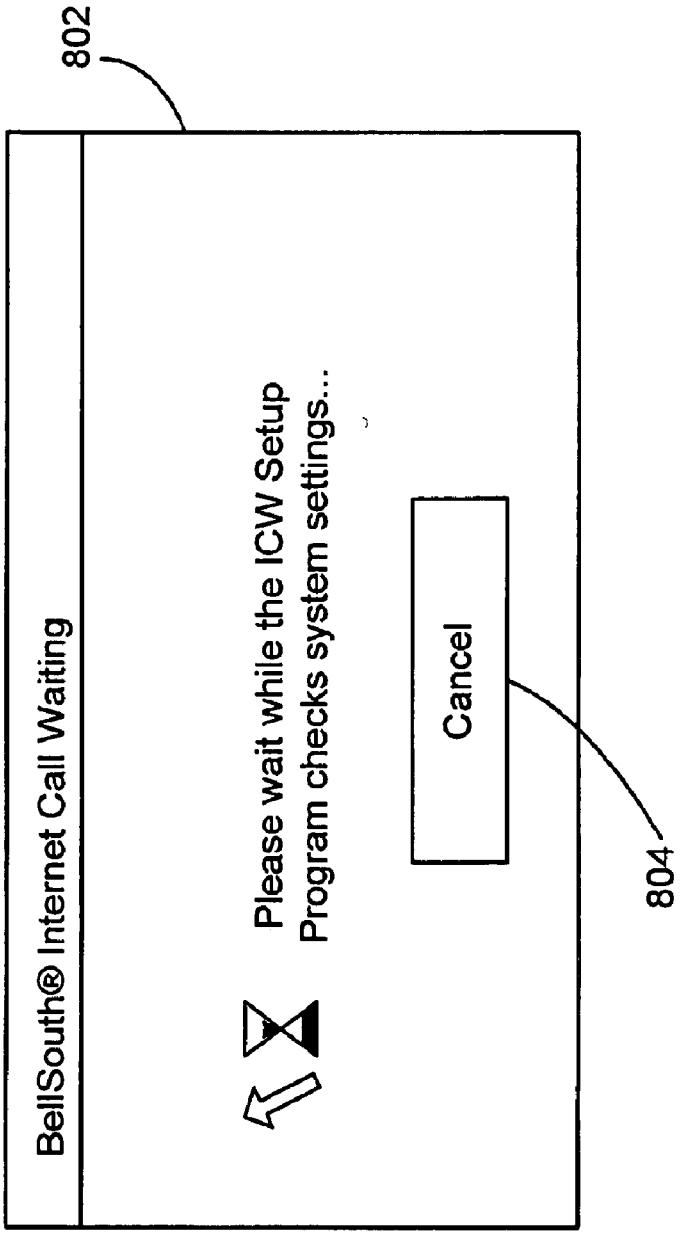

802
BellSouth® Internet Call Waiting
Please wait while the ICW Setup Program checks system settings...
Cancel
804

FIG. 8

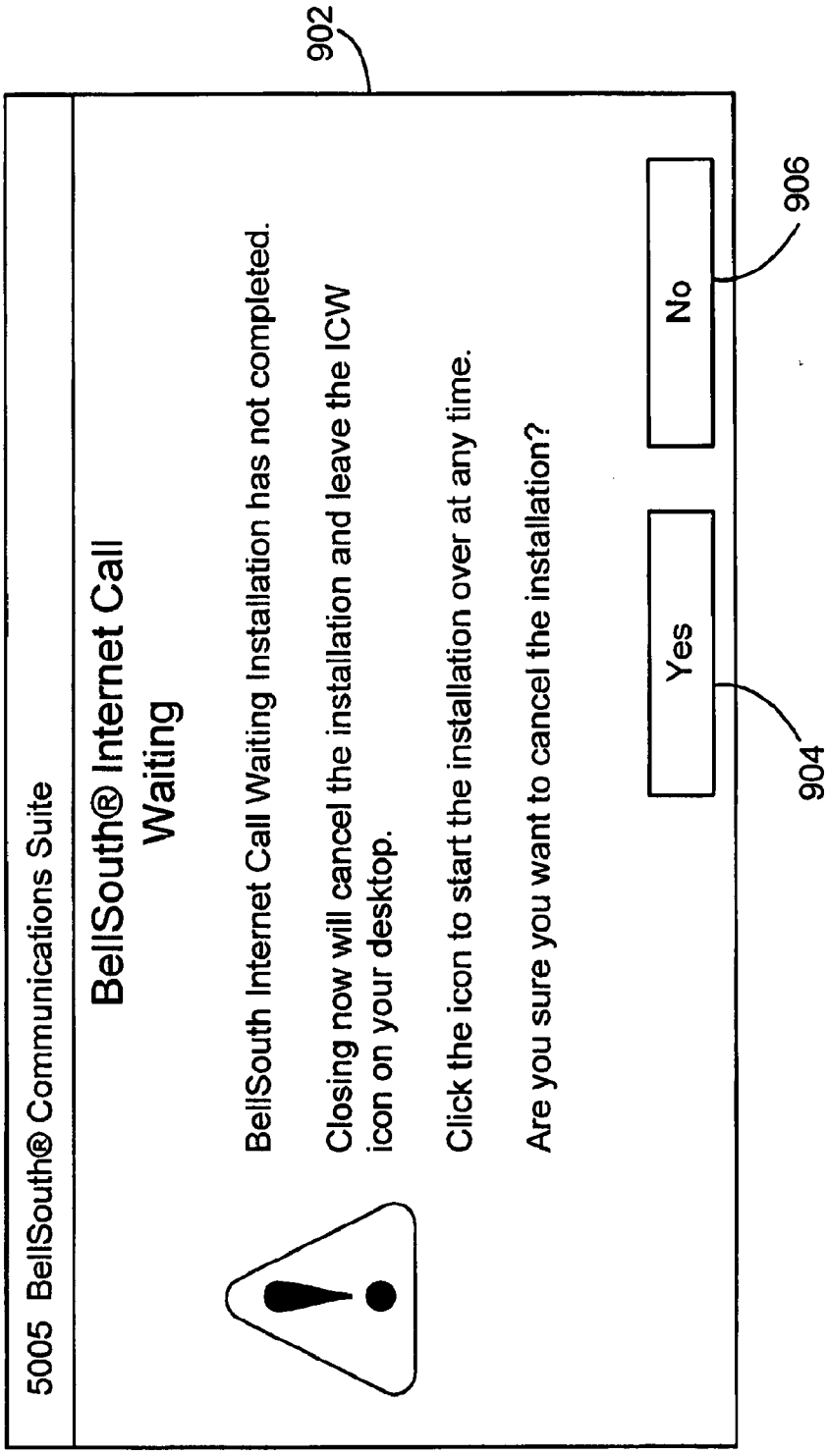

5005 BellSouth® Communications Suite
BellSouth® Internet Call Waiting
BellSouth Internet Call Waiting Installation has not completed.
Closing now will cancel the installation and leave the ICW icon on your desktop.
Click the icon to start the installation over at any time.
Are you sure you want to cancel the installation?
Yes
No
902
904
906

FIG. 9

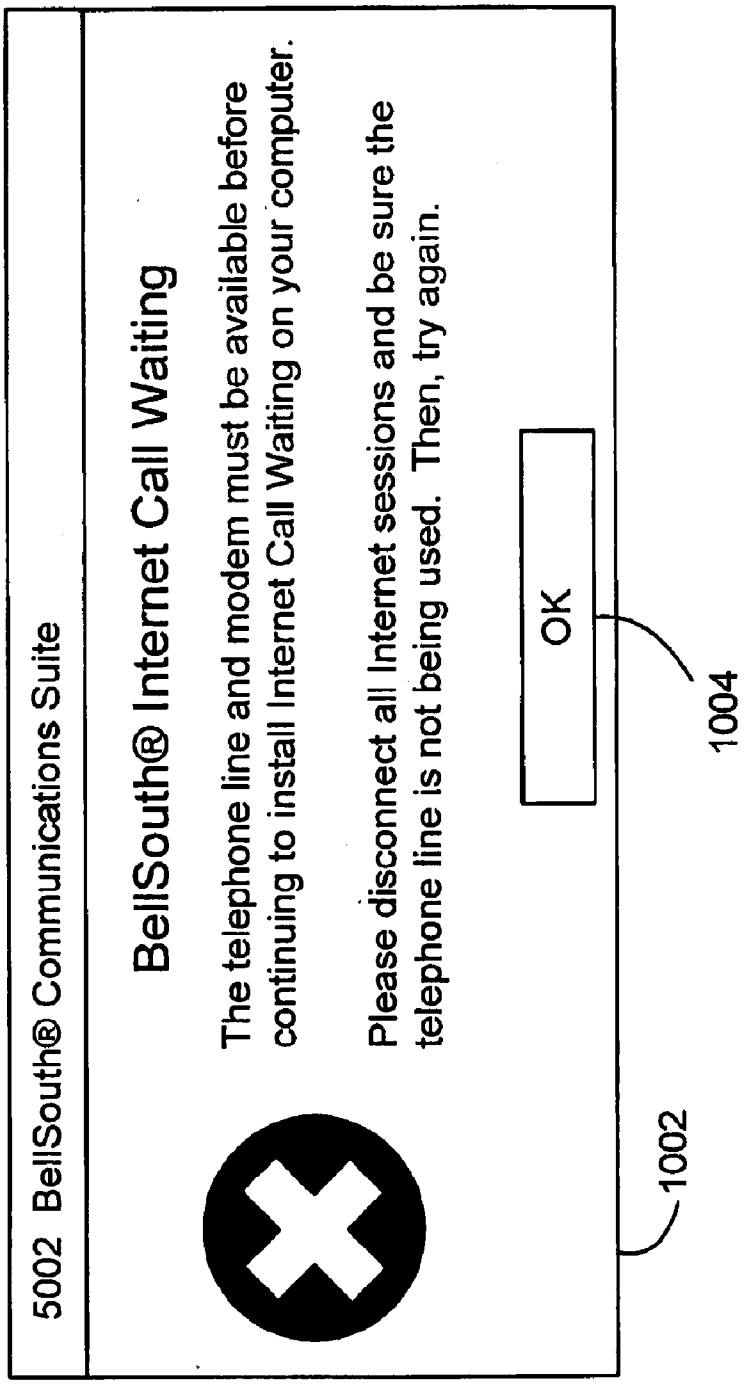

5002 BellSouth® Communications Suite
BellSouth® Internet Call Waiting
The telephone line and modem must be available before continuing to install Internet Call Waiting on your computer.
Please disconnect all Internet sessions and be sure the telephone line is not being used. Then, try again.
OK
1002
1004

FIG. 10

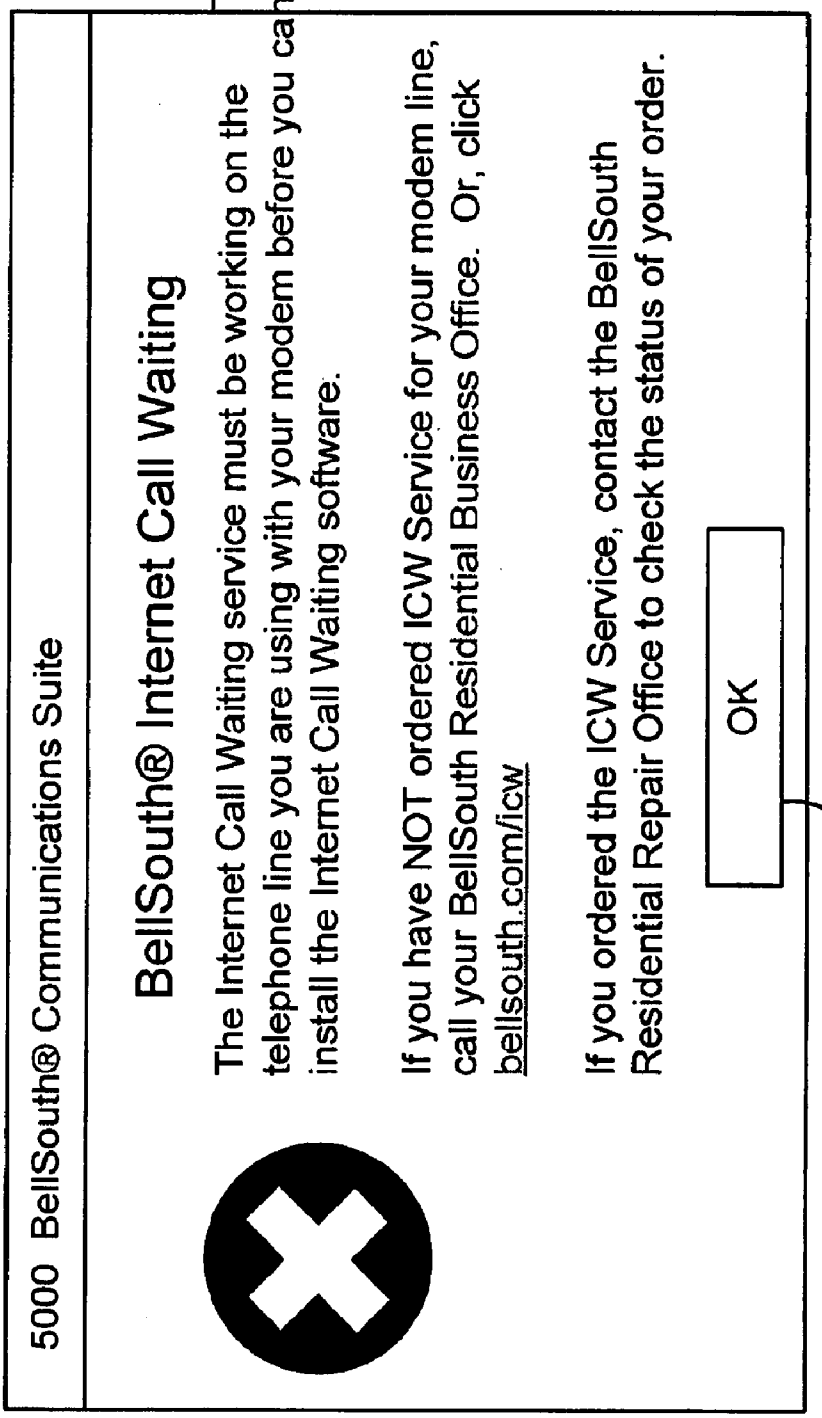

5000 BellSouth® Communications Suite
BellSouth® Internet Call Waiting
The Internet Call Waiting service must be working on the telephone line you are using with your modem before you can install the Internet Call Waiting software.
If you have NOT ordered ICW Service for your modem line, call your BellSouth Residential Business Office. Or, click bellsouth.com/icw
If you ordered the ICW Service, contact the BellSouth Residential Repair Office to check the status of your order.
OK
1102
1104

FIG. 11

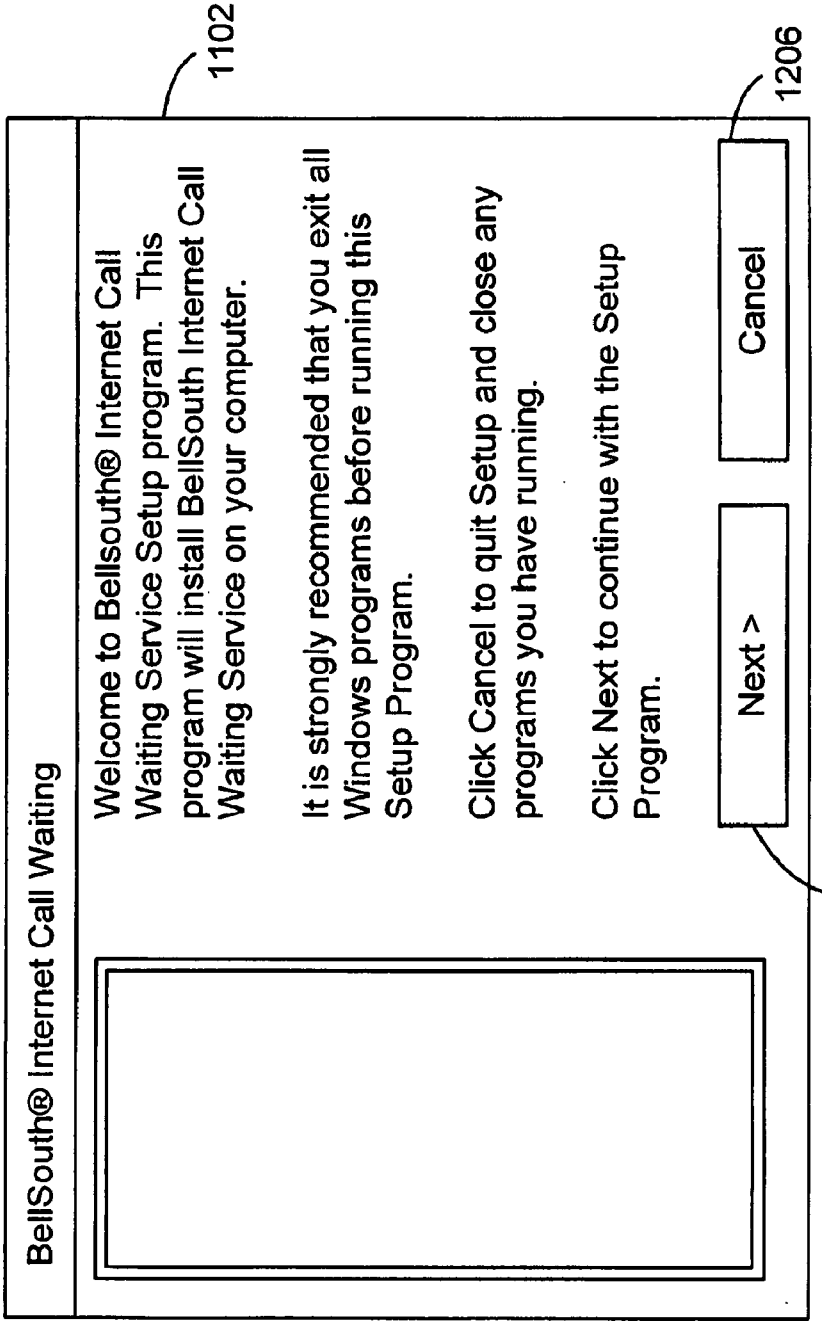
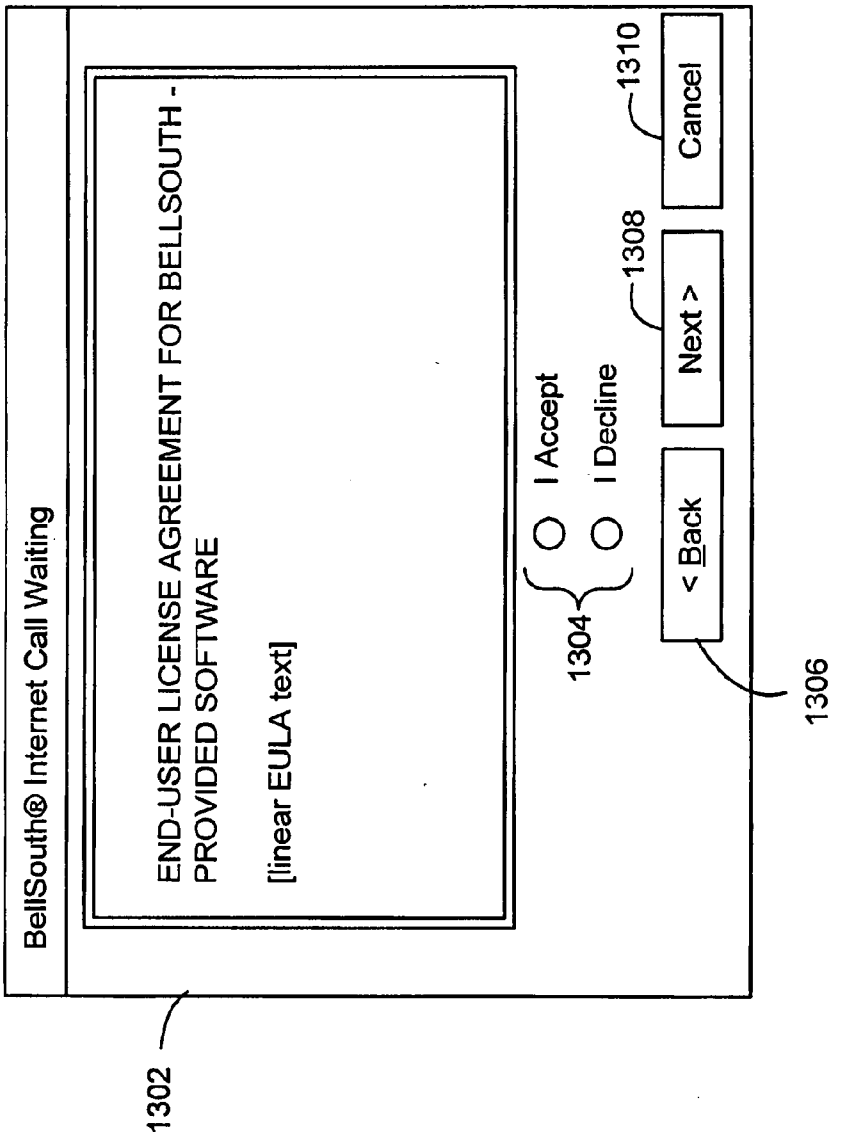

BellSouth® Internet Call Waiting
Welcome to Bellsouth® Internet Call Waiting Service Setup program. This program will install BellSouth Internet Call Waiting Service on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup Program.
Click Cancel to quit Setup and close any programs you have running.
Click Next to continue with the Setup Program.
Next >
Cancel
1102
1204
1206

FIG. 12

FIG. 13


BellSouth® Internet Call Waiting
END-USER LICENSE AGREEMENT FOR BELLSOUTH - PROVIDED SOFTWARE
[linear EULA text]
I Accept
I Decline
1304
1308
Next >
1310
Cancel
< Back
1306
1302

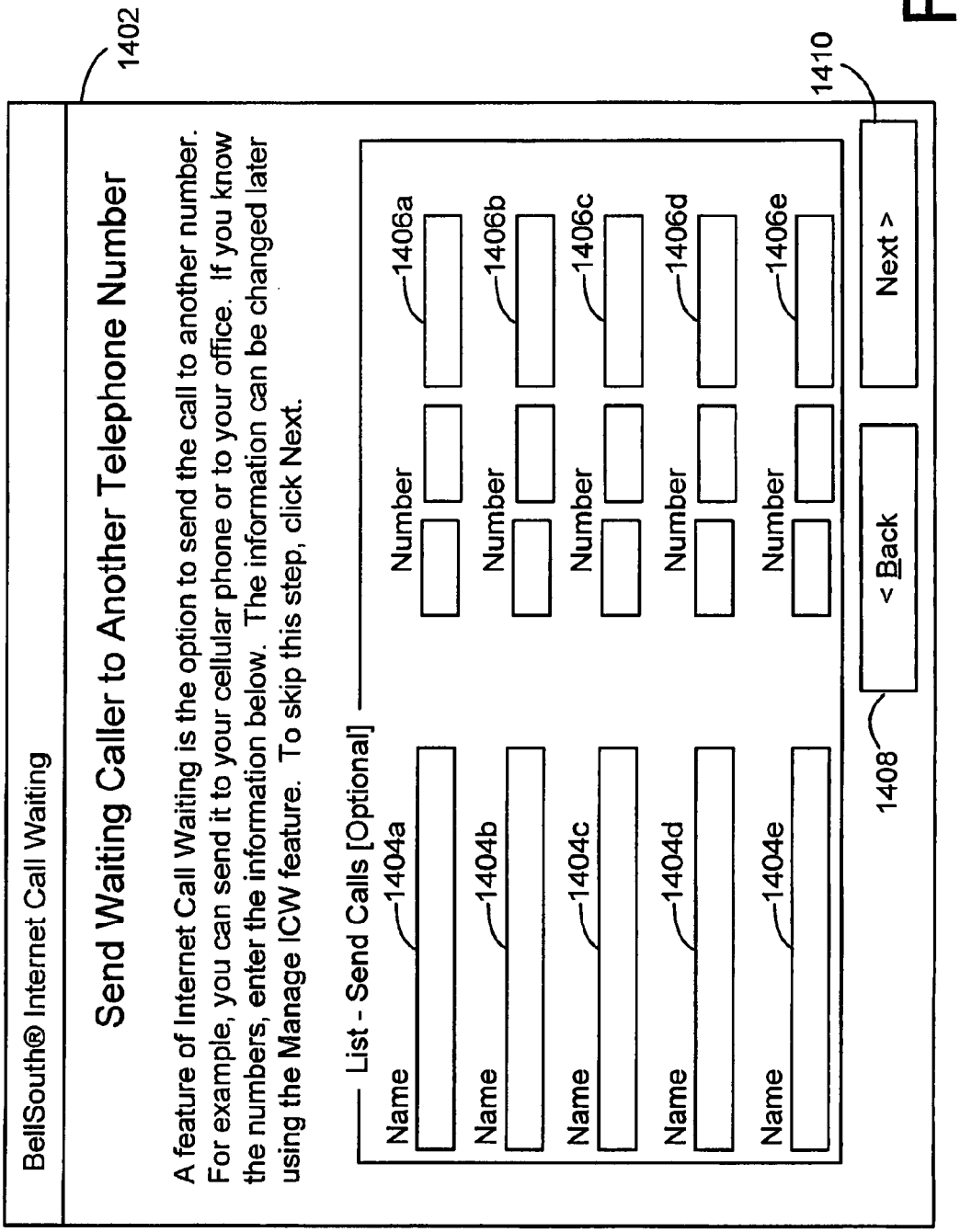

BellSouth® Internet Call Waiting
1402
Send Waiting Caller to Another Telephone Number
A feature of Internet Call Waiting is the option to send the call to another number. For example, you can send it to your cellular phone or to your office. If you know the numbers, enter the information below. The information can be changed later using the Manage ICW feature. To skip this step, click Next.
List - Send Calls [Optional]
Name
1404a
Number
1406a
Name
1404b
Number
1406b
Name
1404c
Number
1406c
Name
1404d
Number
1406d
Name
1404e
Number
1406e
1408
< Back
Next >
1410

FIG. 14

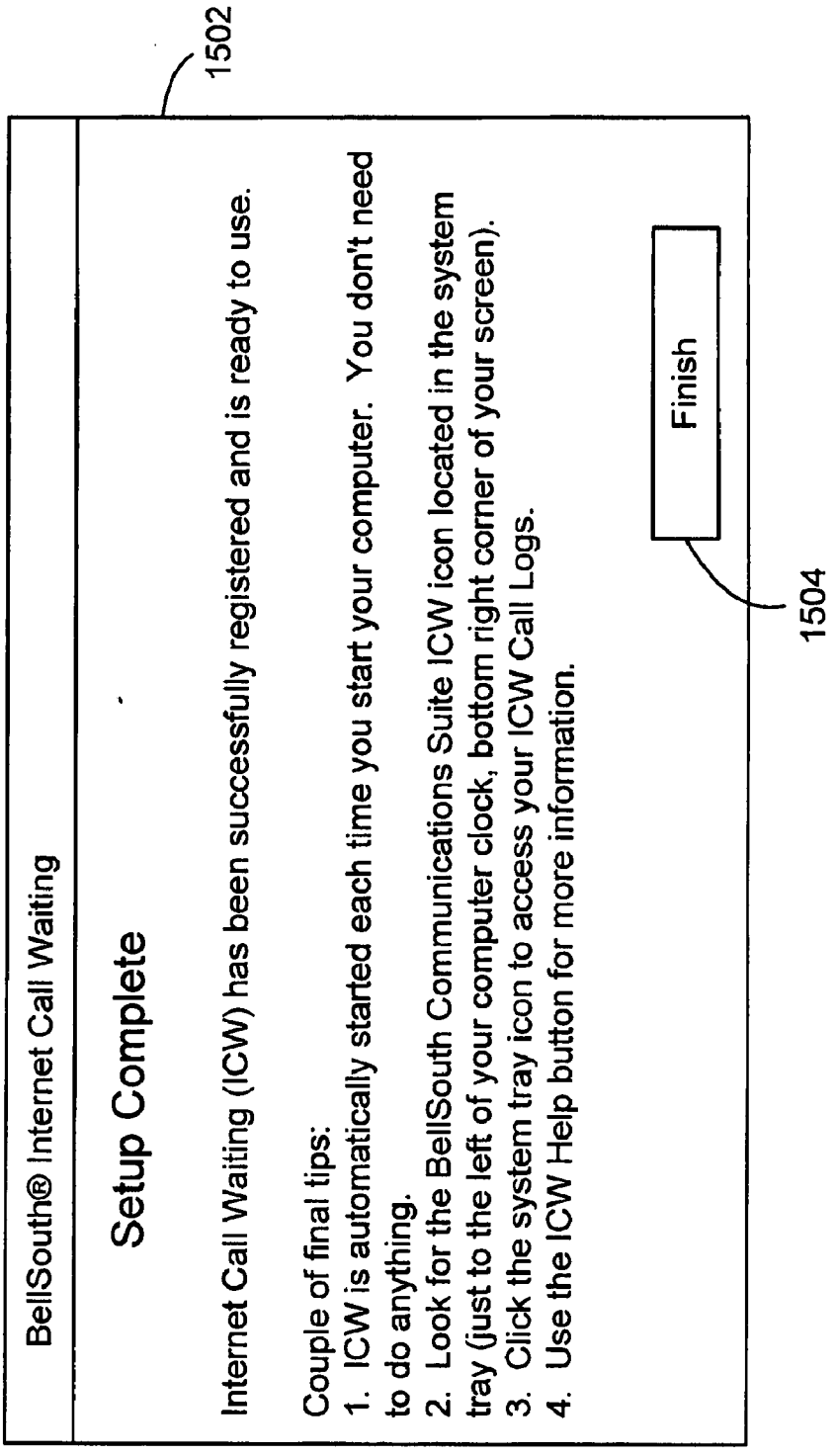

BellSouth® Internet Call Waiting
Setup Complete
Internet Call Waiting (ICW) has been successfully registered and is ready to use.
Couple of final tips:
1. ICW is automatically started each time you start your computer. You don't need to do anything.
2. Look for the BellSouth Communications Suite ICW icon located in the system tray (just to the left of your computer clock, bottom right corner of your screen).
3. Click the system tray icon to access your ICW Call Logs.
4. Use the ICW Help button for more information.
Finish
1502
1504

FIG. 15

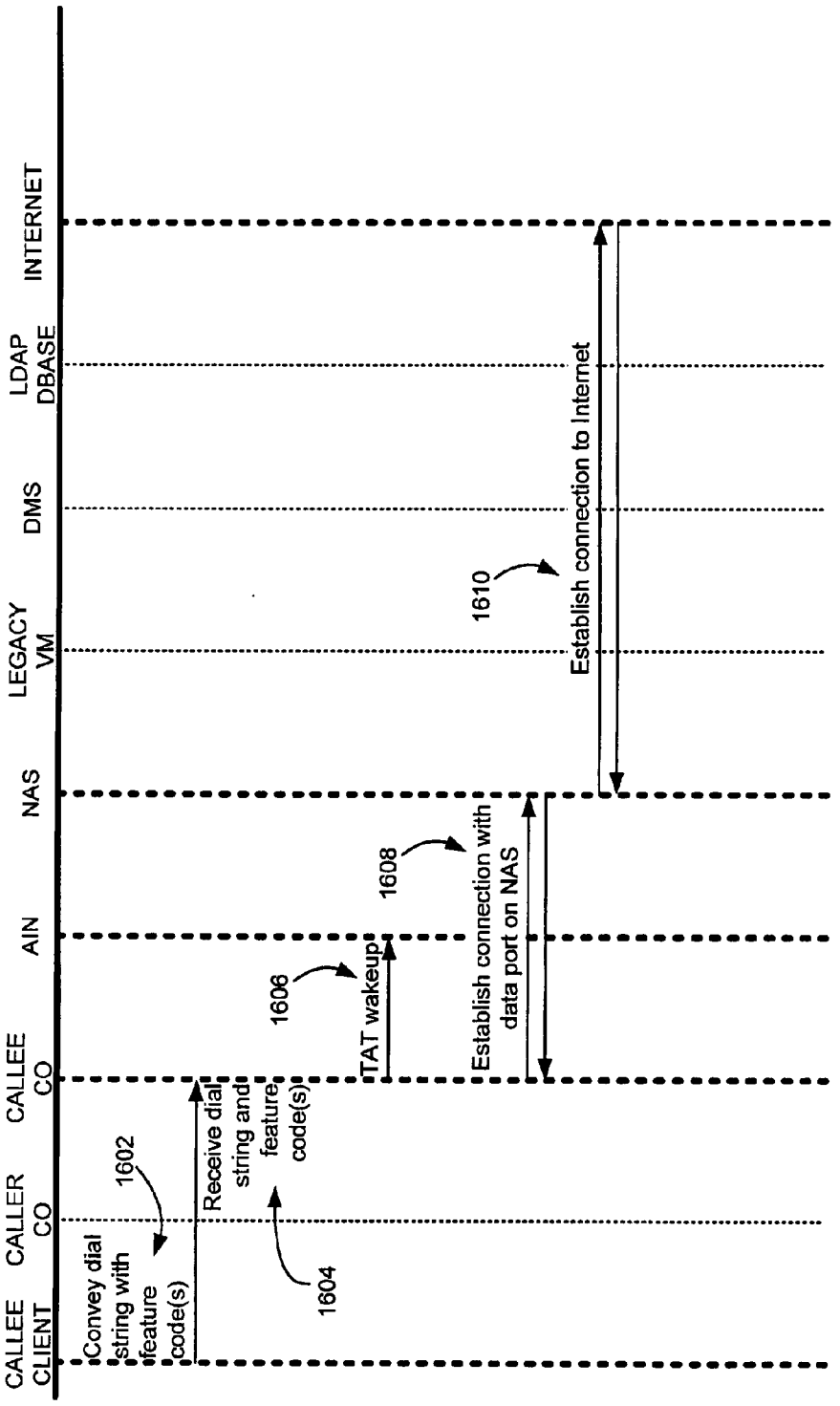

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Convey dial string with feature code(s)
1602
Receive dial string and feature code(s)
1604
1606
TAT wakeup
1608
Establish connection with data port on NAS
1610
Establish connection to Internet

FIG. 16

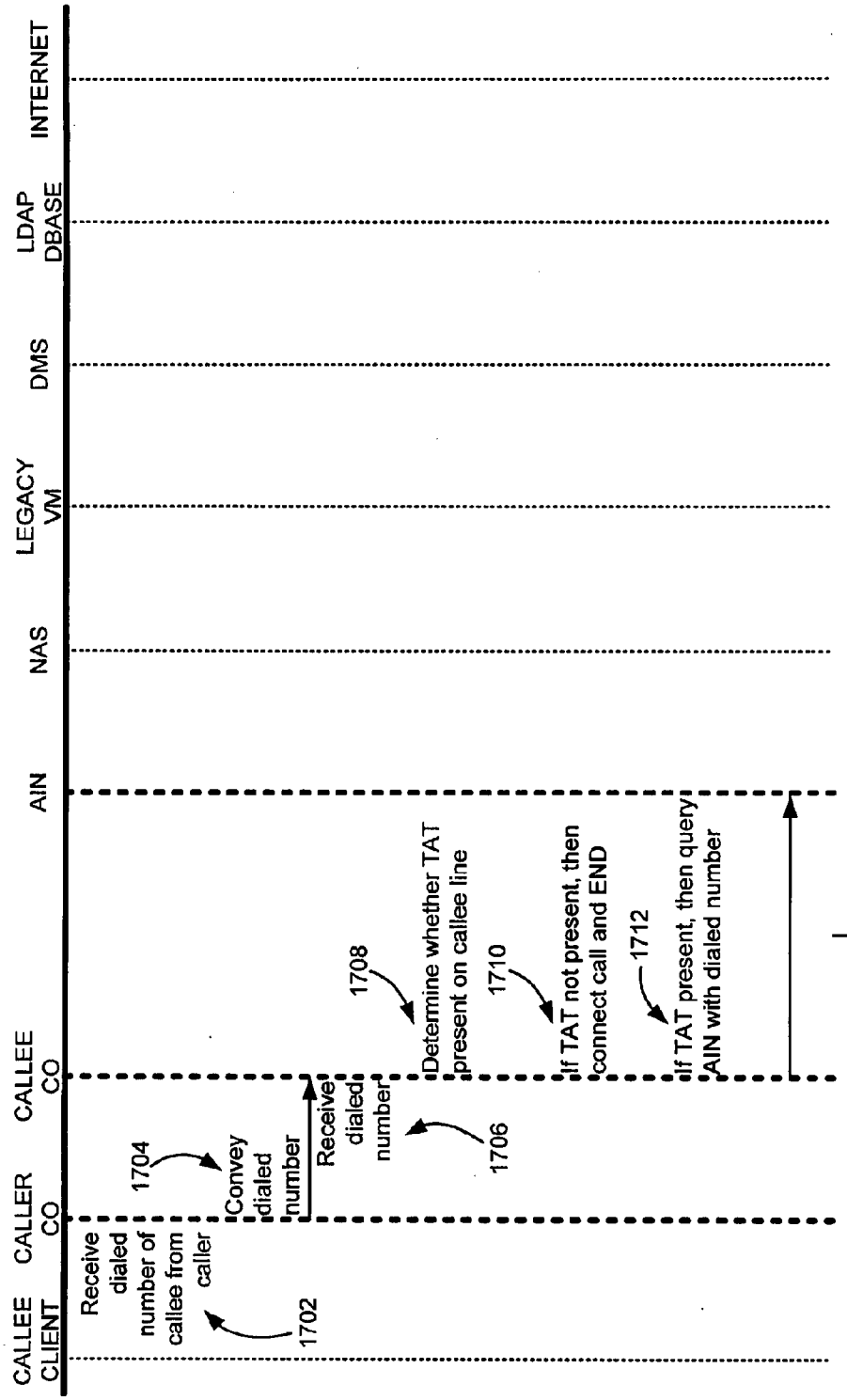

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Receive dialed number of callee from caller
1702
1704
Convey dialed number
Receive dialed number
1706
1708
Determine whether TAT present on callee line
1710
If TAT not present, then connect call and END
1712
If TAT present, then query AIN with dialed number
to FIG. 18

FIG. 17

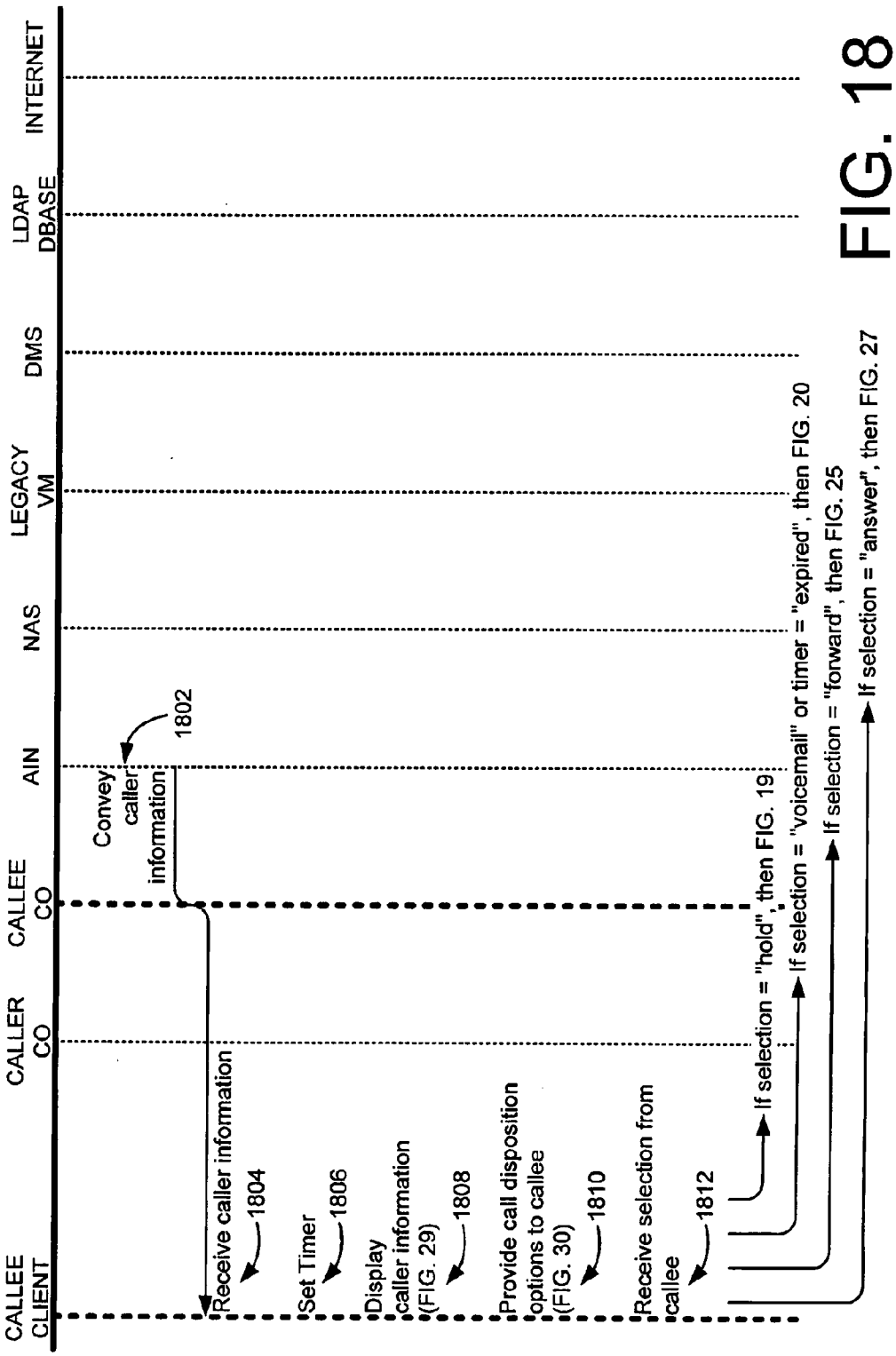

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Convey caller information
1802
Receive caller information
1804
Set Timer
1806
Display caller information (FIG. 29)
1808
Provide call disposition options to callee (FIG. 30)
1810
Receive selection from callee
1812
If selection = "hold", then FIG. 19
If selection = "voicemail" or timer = "expired", then FIG. 20
If selection = "forward", then FIG. 25
If selection = "answer", then FIG. 27

FIG. 18

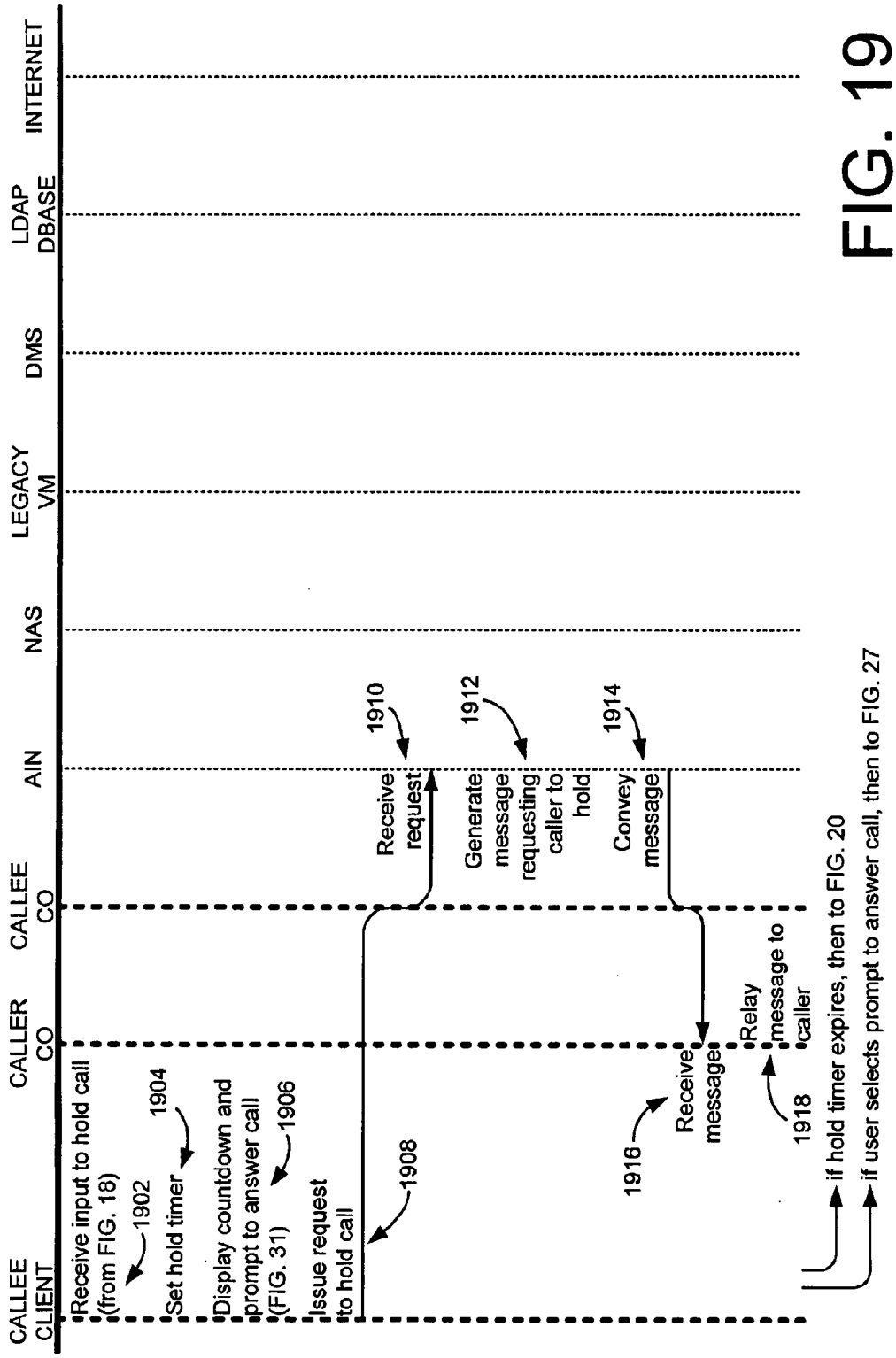

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Receive input to hold call (from FIG. 18)
1902
Set hold timer
1904
Display countdown and prompt to answer call (FIG. 31)
1906
Issue request to hold call
1908
Receive request
1910
Generate message requesting caller to hold
1912
Convey message
1914
Receive message
1916
Relay message to caller
1918
if hold timer expires, then to FIG. 20
if user selects prompt to answer call, then to FIG. 27

FIG. 19

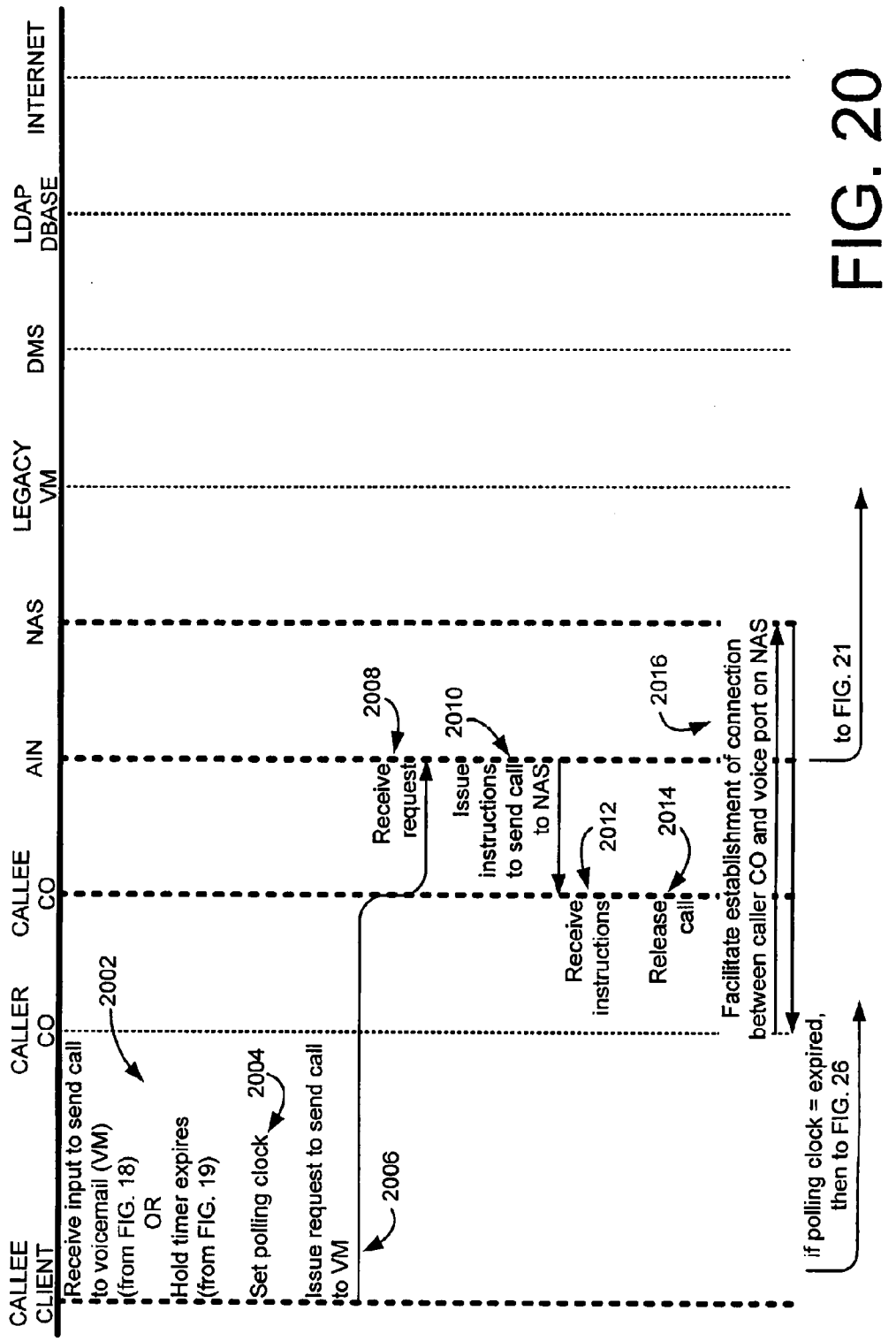

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Receive input to send call to voicemail (VM) (from FIG. 18)
OR
Hold timer expires (from FIG. 19)
2002
Set polling clock
2004
Issue request to send call to VM
2006
Receive request
2008
Issue instructions to send call to NAS
2010
Receive instructions
2012
Release call
2014
2016
Facilitate establishment of connection between caller CO and voice port on NAS
to FIG. 21
if polling clock = expired, then to FIG. 26

FIG. 20

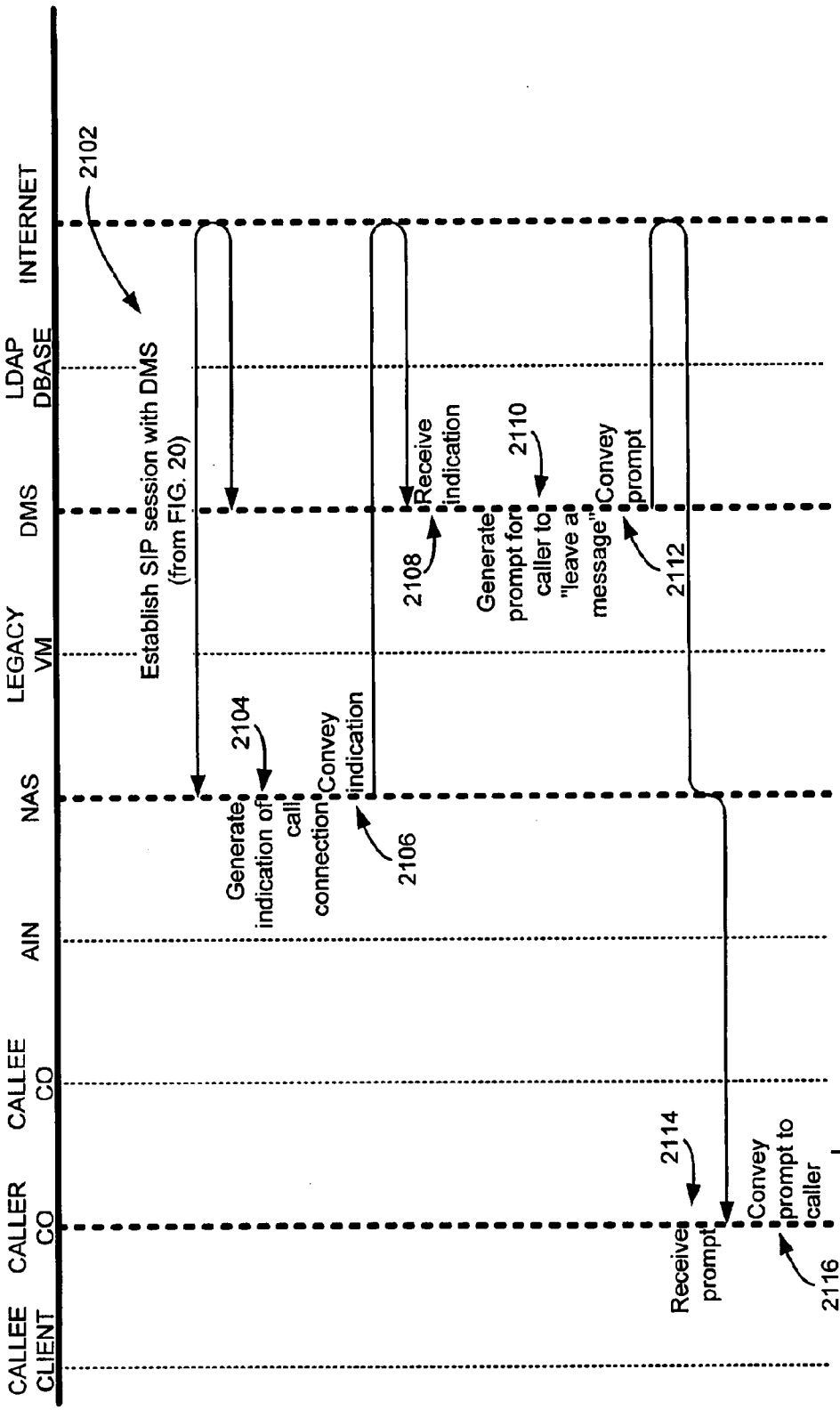

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
2102
Establish SIP session with DMS (from FIG. 20)
2104
Generate indication of call connection
Convey indication
2106
2108
Receive indication
Generate prompt for caller to "leave a message"
2110
Convey prompt
2112
2114
Receive prompt
Convey prompt to caller
2116
to FIG. 22

FIG. 21

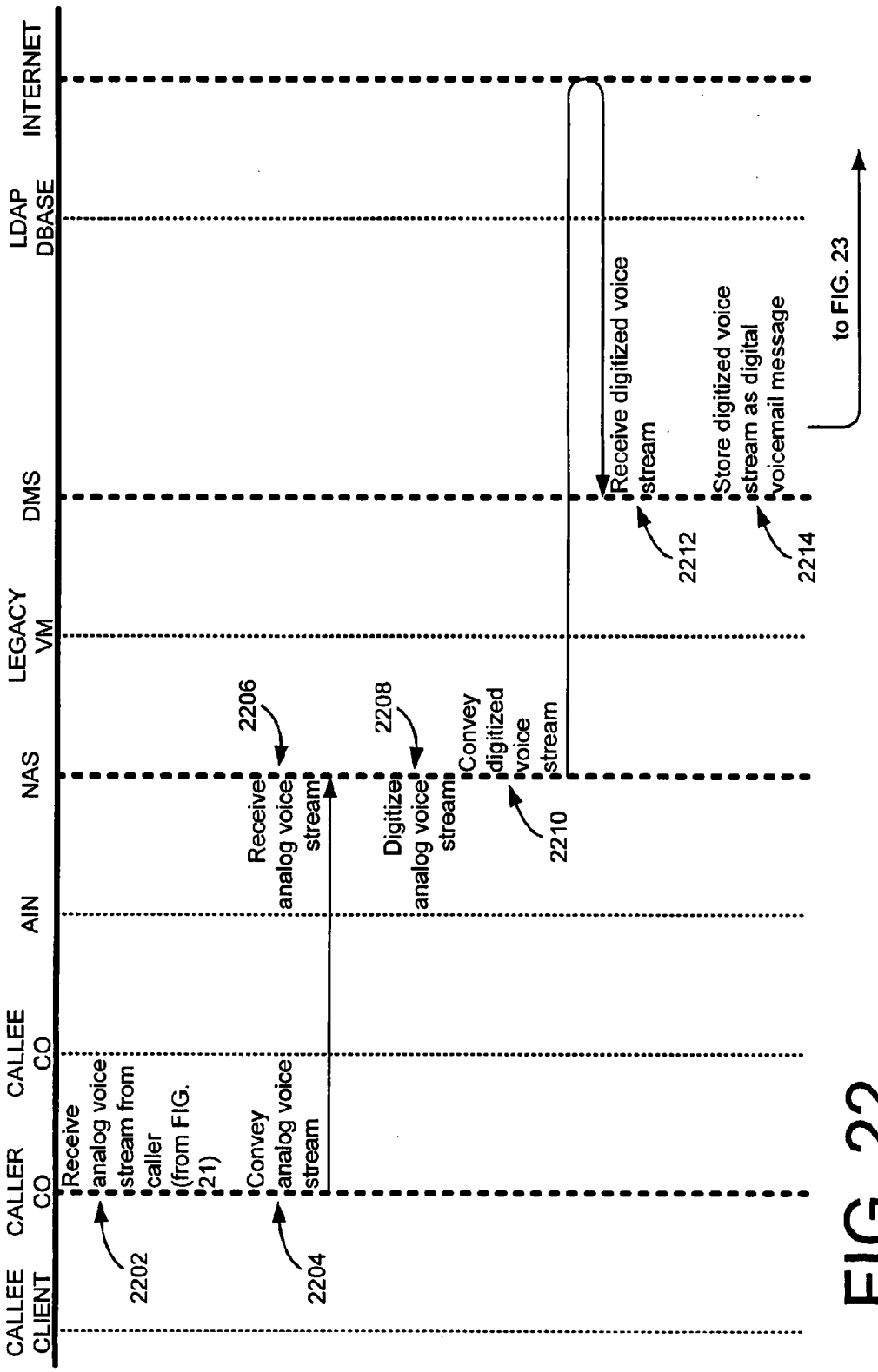

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Receive analog voice stream from caller (from FIG. 21)
Convey analog voice stream
Receive analog voice stream
Digitize analog voice stream
Convey digitized voice stream
Receive digitized voice stream
Store digitized voice stream as digital voicemail message
to FIG. 23
2202
2204
2206
2208
2210
2212
2214

FIG. 22

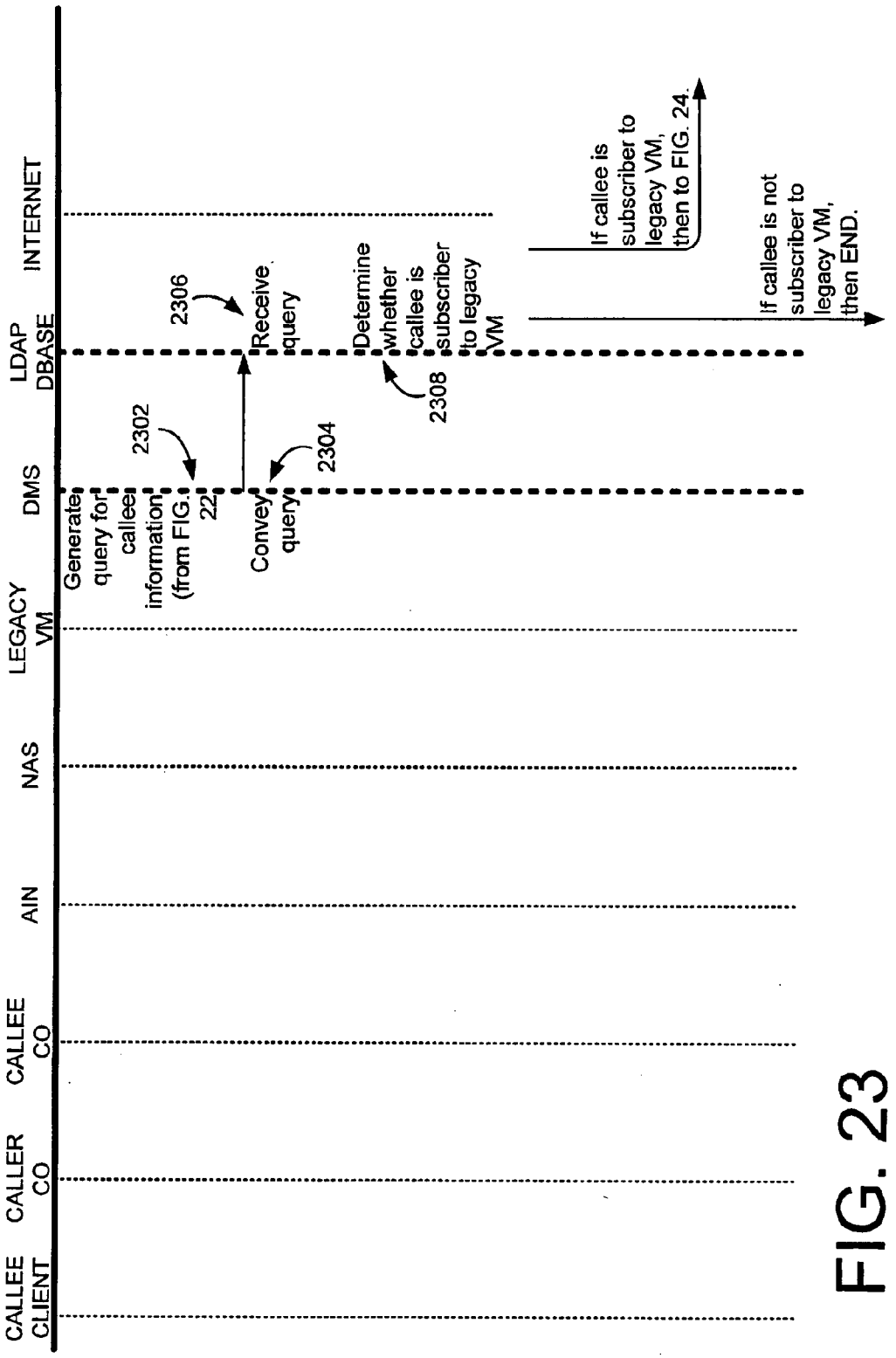

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Generate query for callee information (from FIG. 22)
2302
Convey query
2304
2306
Receive query
Determine whether callee is subscriber to legacy VM
2308
If callee is subscriber to legacy VM, then to FIG. 24.
If callee is not subscriber to legacy VM, then END.

FIG. 23

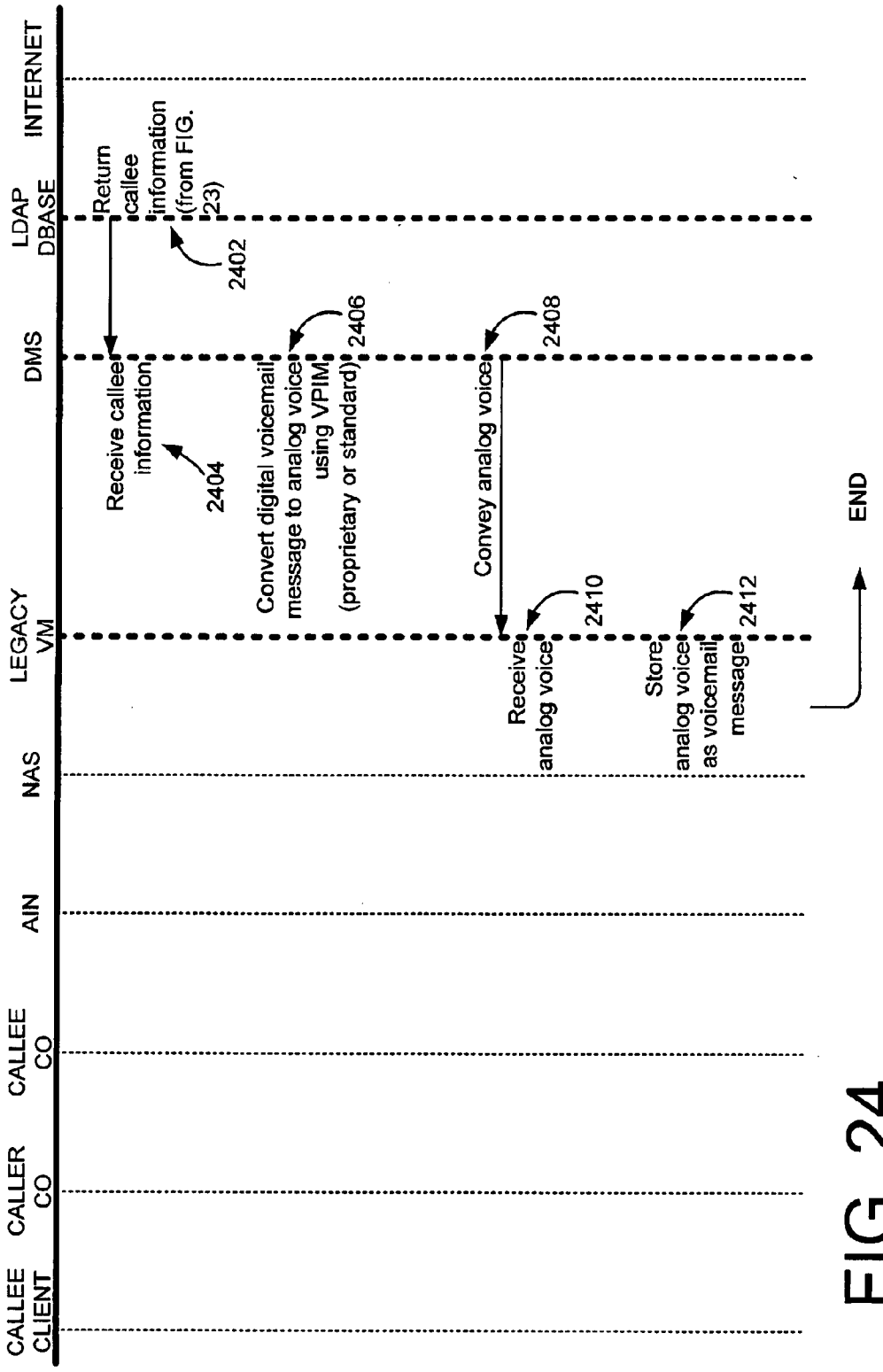

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Return callee information (from FIG. 23)
2402
Receive callee information
2404
Convert digital voicemail message to analog voice using VPIM (proprietary or standard)
2406
Convey analog voice
2408
Receive analog voice
2410
Store analog voice as voicemail message
2412
END

FIG. 24

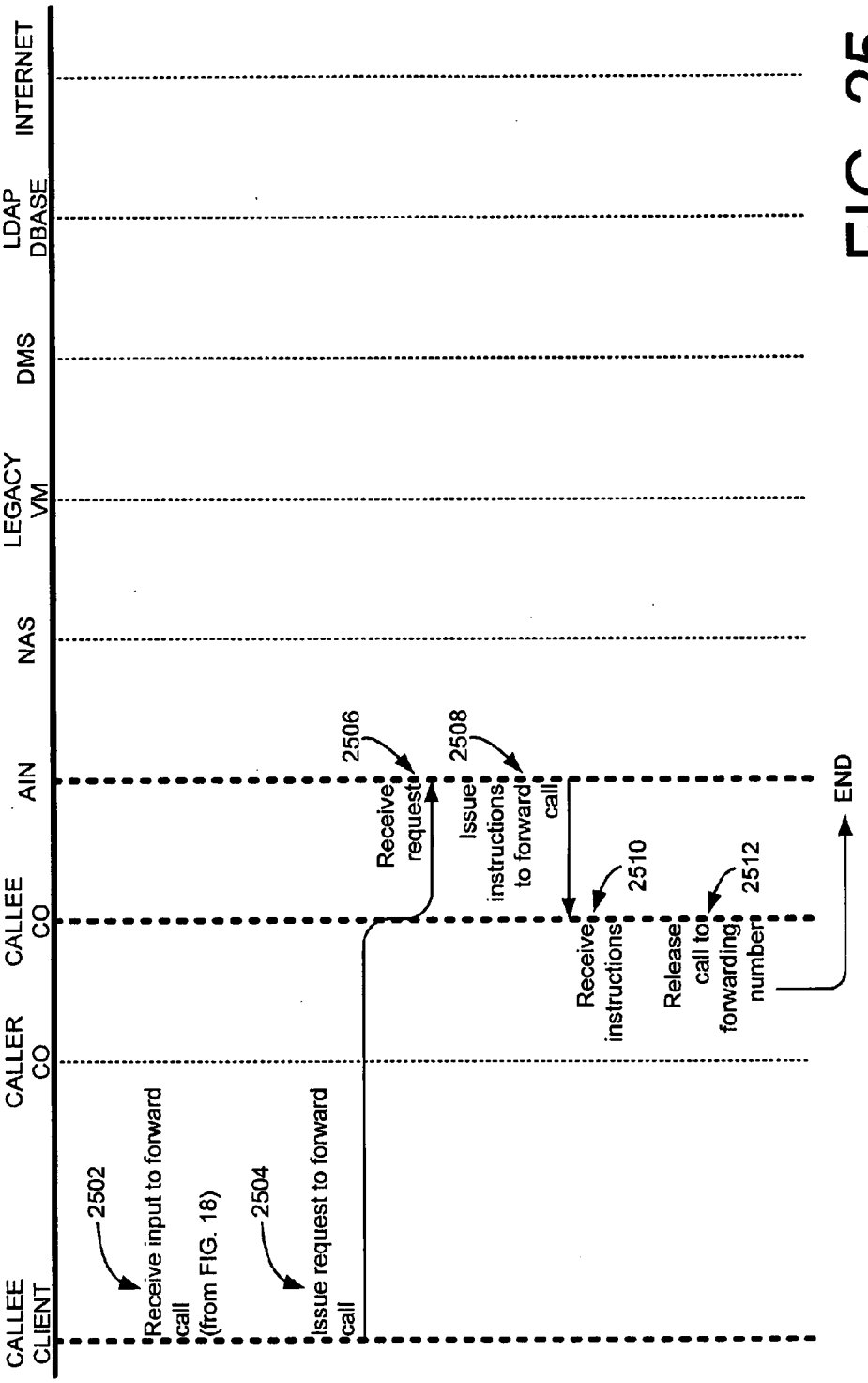

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
2502
Receive input to forward call (from FIG. 18)
2504
Issue request to forward call
2506
Receive request
2508
Issue instructions to forward call
2510
Receive instructions
2512
Release call to forwarding number
END

FIG. 25

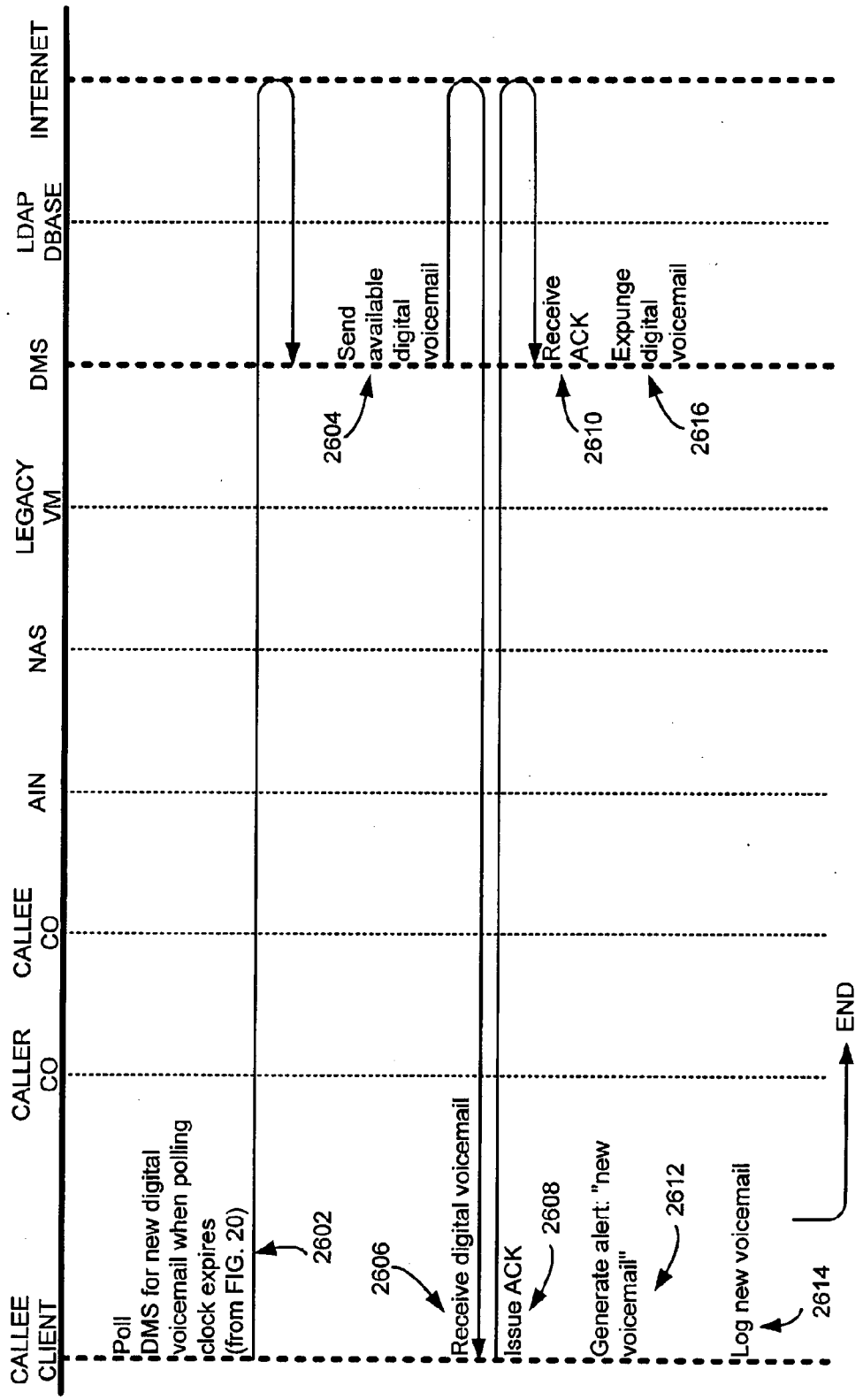

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Poll DMS for new digital voicemail when polling clock expires (from FIG. 20)
2602
2604
Send available digital voicemail
2606
Receive digital voicemail
Issue ACK
2608
2610
Receive ACK
Expunge digital voicemail
2612
2616
Generate alert: "new voicemail"
Log new voicemail
2614
END

FIG. 26

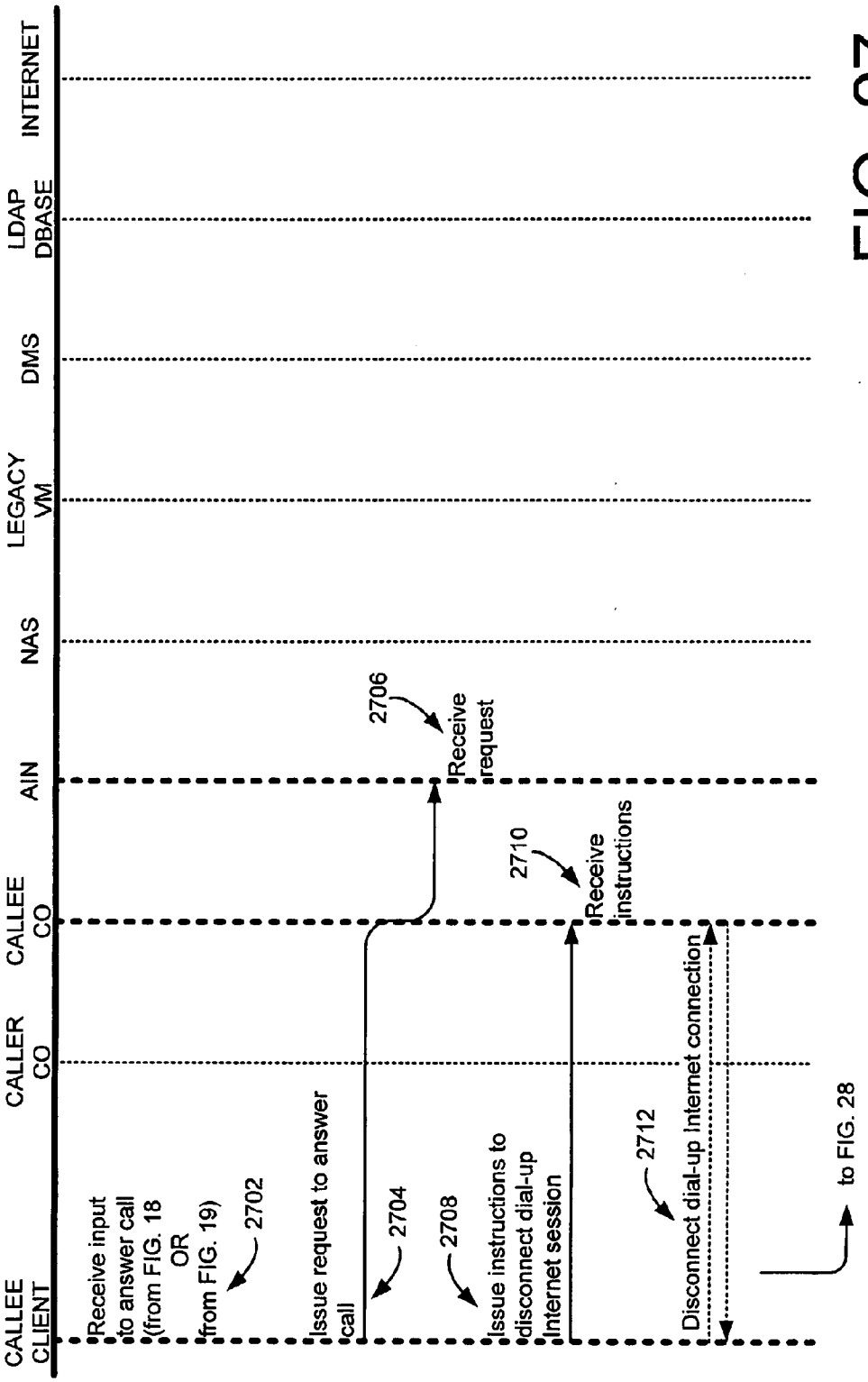

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Receive input to answer call (from FIG. 18 OR from FIG. 19)
2702
Issue request to answer call
2704
2706
Receive request
2708
Issue instructions to disconnect dial-up Internet session
2710
Receive instructions
2712
Disconnect dial-up Internet connection
to FIG. 28

FIG. 27

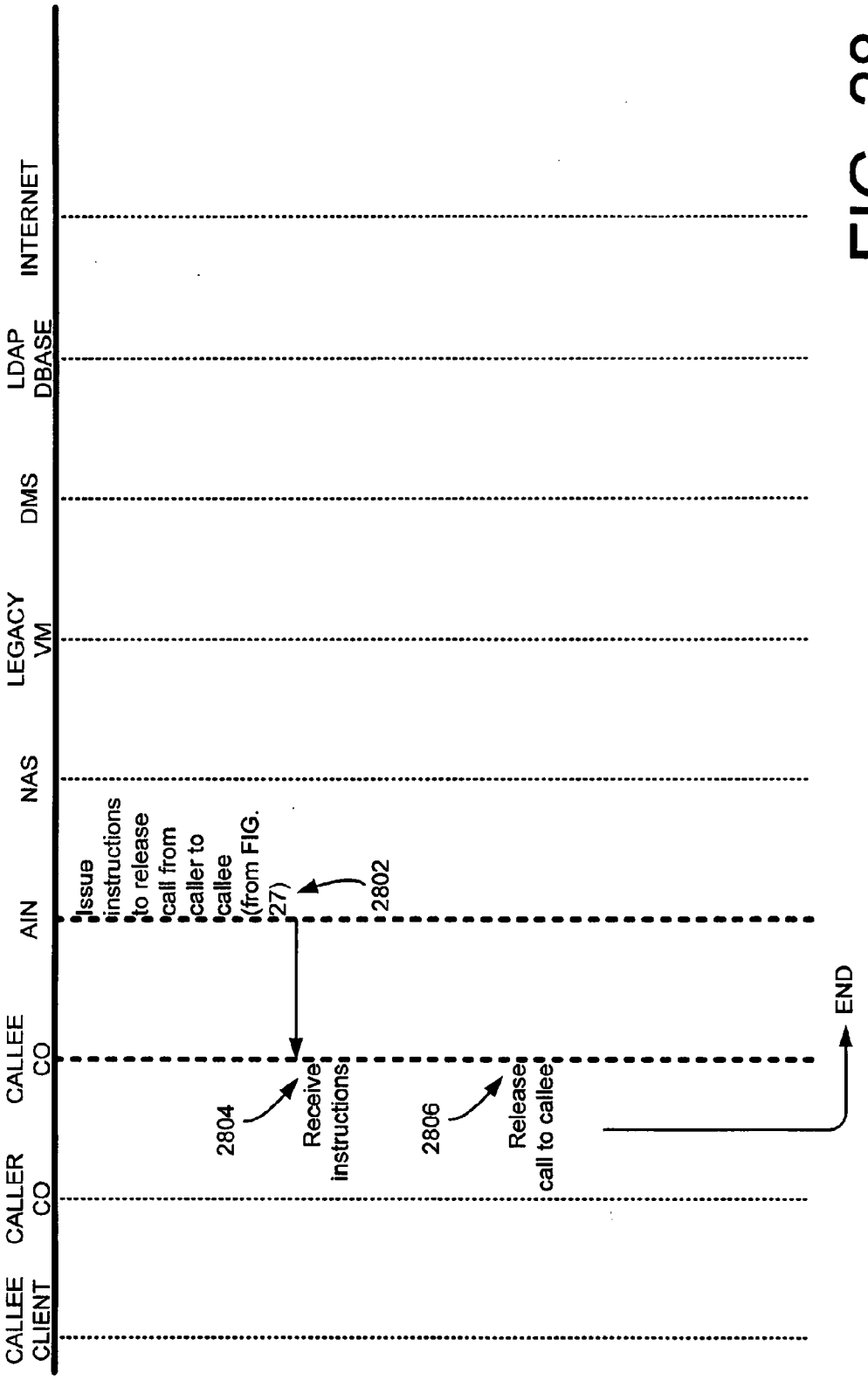
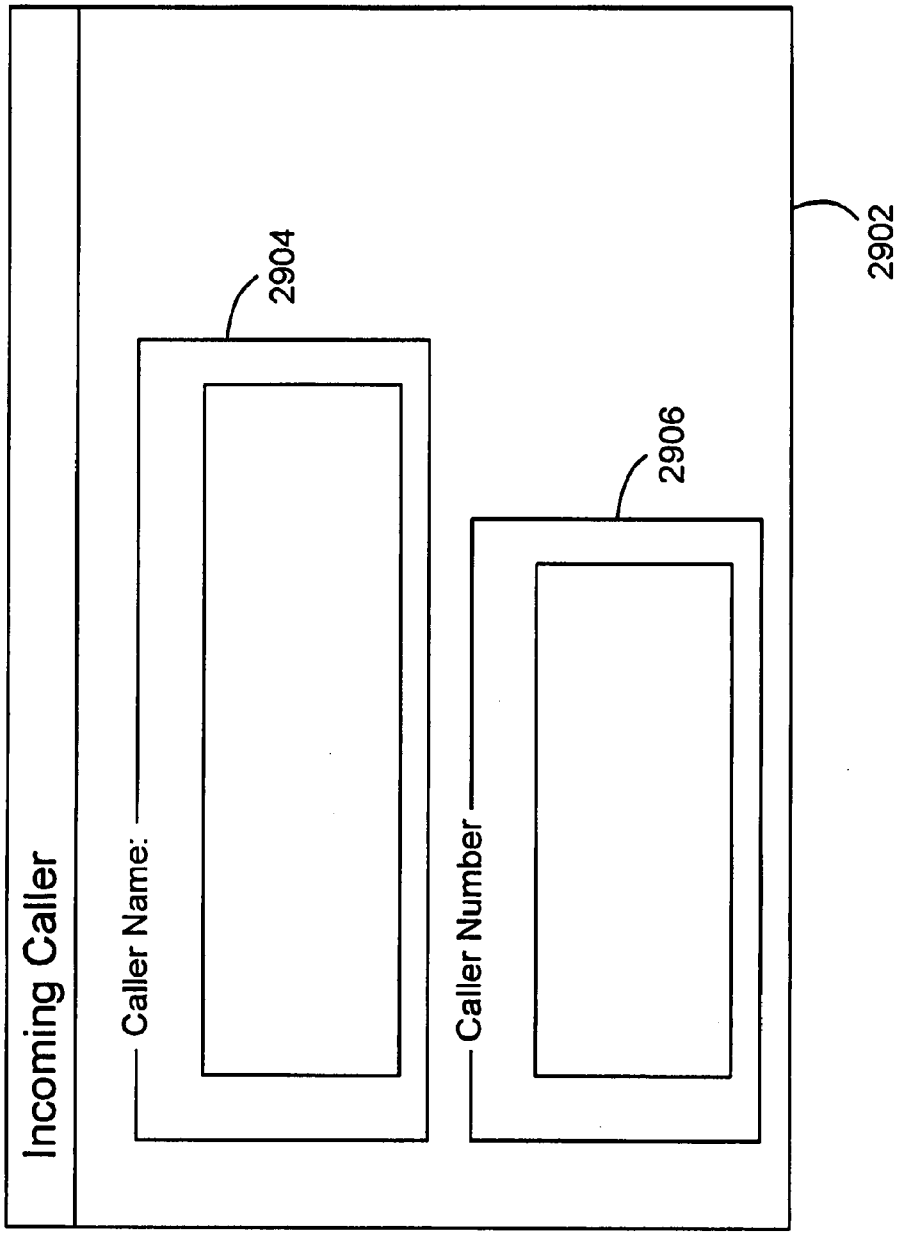

CALLEE CLIENT
CALLER CO
CALLEE CO
AIN
NAS
LEGACY VM
DMS
LDAP DBASE
INTERNET
Issue instructions to release call from caller to callee (from FIG. 27)
2802
2804
Receive instructions
2806
Release call to callee
END

FIG. 28

FIG. 29



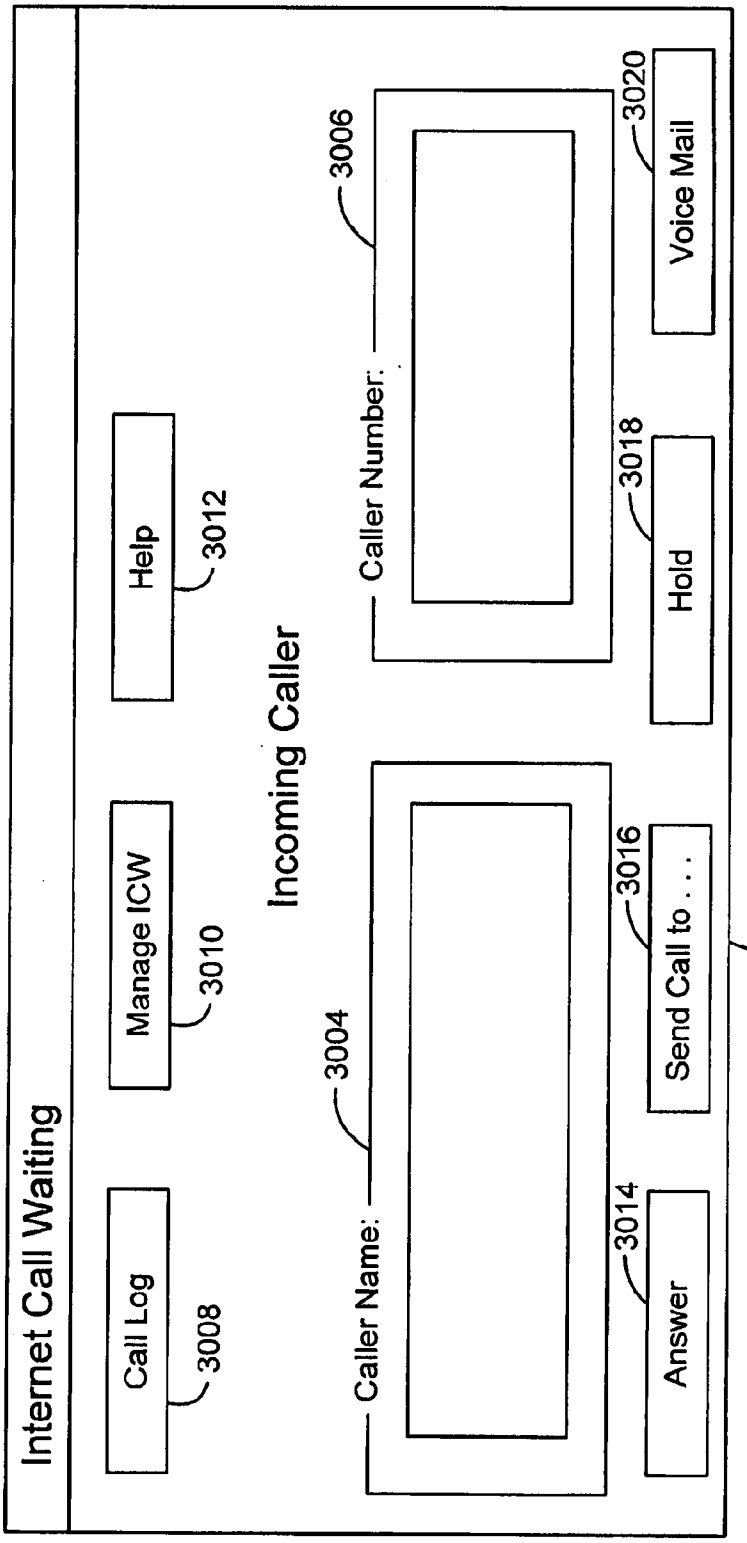

Internet Call Waiting
Call Log
3008
Manage ICW
3010
Help
3012
Incoming Caller
Caller Name:
3004
Caller Number:
3006
Answer
3014
Send Call to . . .
3016
Hold
3018
Voice Mail
3020
3002

FIG. 30

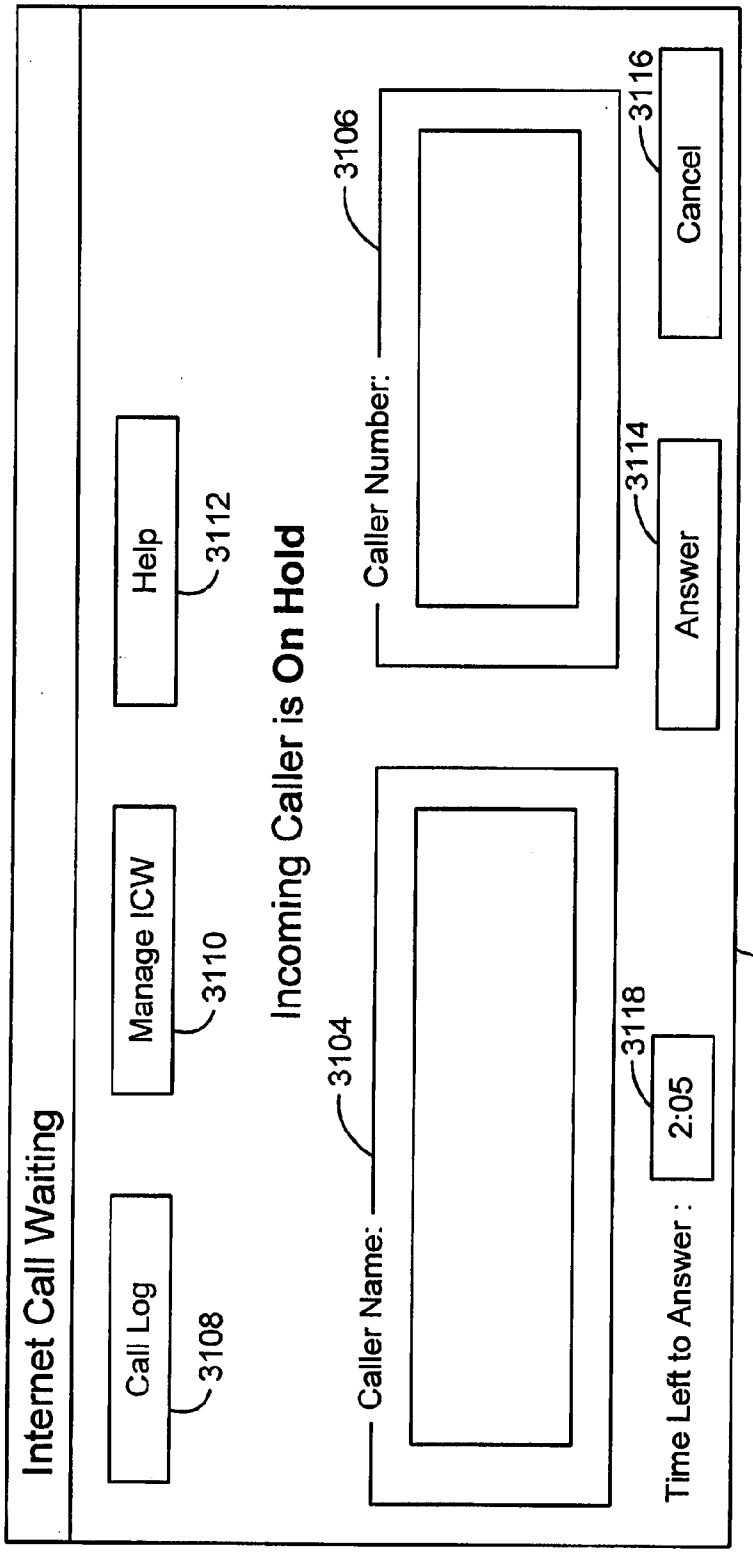

Internet Call Waiting
Call Log
3108
Manage ICW
3110
Help
3112
Incoming Caller is On Hold
Caller Name:
3104
Caller Number:
3106
Answer
3114
Cancel
3116
Time Left to Answer :
2:05
3118
3102

FIG. 31

SUBSTANTIALLY SYNCHRONOUS DEPOSIT OF MESSAGES INTO MULTIPLE COMMUNICATION MODALITIES

CROSS REFERENCE

[0001] This application is a continuation of U.S. patent application Ser. No. 10/747,823, filed Dec. 29, 2003, which is incorporated herein by reference as if set forth in its entirety.

FIELD OF THE INVENTION

[0002] The present disclosure relates generally to communications and, more particularly, to communications in multiple communication modalities.

BACKGROUND

[0003] Recently, email and instant messaging (IM) have become commonplace in digital communications. Additionally, cellular telephones have also become ubiquitous in society. Thus, many people carry multiple devices, such as cellular telephones, email-enabled personal digital assistants (PDAs), etc. in order to keep abreast of all of their incoming communications.

[0004] In an effort to integrate these various communication systems (e.g., public switched telephone network (PSTN) systems, cellular telephone systems, email systems, etc.), various vendors have created "unified messaging systems." Those unified messaging systems provide a centralized repository, which stores messages such as, for example, telephone calls, email messages, etc. The centralized storage of messages provides users access to various communication modalities (e.g., email, voicemail, etc.) through a single user interface.

[0005] Unfortunately, the integration of the various communication systems comes at a significant cost to the vendors because, typically, the integration requires vendors to modify the various individual communication systems. For example, in order to create a unified messaging system that is compatible with both email and telephony, both the underlying architectures of the telephone system and email system are modified as the unified messaging platform is constructed. The modification of the underlying component systems results in a complex architecture that is susceptible to communication errors.

[0006] Thus, a heretofore-unaddressed need exists in the industry to address the aforementioned deficiencies and inadequacies.

SUMMARY

[0007] The present disclosure provides systems and methods for storing messages using multiple communication modalities.

[0008] Briefly described, in some embodiments, among others, a first communication is received from a first communication system. The first communication system is configured to communicate using a first standard communication protocol. The first communication is converted to a second communication, which is compatible with a second standard communication protocol. The first communication and second communication are separately stored. In some embodiments, among others, the first communication and the second communication are stored substantially synchronously at two separate communication systems.

[0009] Other systems, devices, methods, features, and advantages will be or become apparent to one with skill in the art upon examination of the following drawings and detailed description. It is intended that all such additional systems, methods, features, and advantages be included within this description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0011] FIG. **1** is a block diagram showing component architecture for a computer that has a callee client, as shown in FIG. **2**.

[0012] FIG. **2** is a block diagram showing various system components associated with multiple communication modalities.

[0013] FIG. **3** is a flowchart showing initial steps of an embodiment in a process for setting up a user interface at the computer of FIG. **1**.

[0014] FIG. **4** is a flowchart showing an embodiment of a process continuing from FIG. **3**.

[0015] FIG. **5** is a flowchart showing an embodiment of a process continuing from FIG. **4**.

[0016] FIG. **6** is a flowchart showing an embodiment of a process continuing from FIG. **5**.

[0017] FIG. **7** is a flowchart showing an embodiment of a process continuing from FIG. **6**.

[0018] FIG. **8** is a diagram showing an embodiment of a user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0019] FIG. **9** is a diagram showing an embodiment of another user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0020] FIG. **10** is a diagram showing an embodiment of another user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0021] FIG. **11** is a diagram showing an embodiment of another user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0022] FIG. **12** is a diagram showing an embodiment of another user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0023] FIG. **13** is a diagram showing an embodiment of another user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0024] FIG. **14** is a diagram showing an embodiment of another user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0025] FIG. **15** is a diagram showing an embodiment of another user interface that can be presented to a user during the setup process of FIGS. **3** through **7**.

[0026] FIG. **16** is a data flow diagram showing one embodiment, among others, of an initial stage of the flow of data between the various system components of FIG. **2** for Internet call waiting (ICW).

[0027] FIG. **17** is a data flow diagram showing an embodiment of a process continuing from FIG. **16**.

[0028] FIG. **18** is a data flow diagram showing an embodiment of a process continuing from FIG. **17**.

[0029] FIG. **19** is a data flow diagram showing one embodiment, among others, of the flow of data between the various system components of FIG. **2** when a callee places a caller on hold, as shown in FIG. **18**.

[0030] FIG. **20** is a data flow diagram showing an embodiment of a process continuing from FIG. **18** or **19**.

[0031] FIG. **21** is a data flow diagram showing an embodiment of a process continuing from FIG. **20**.

[0032] FIG. **22** is a data flow diagram showing an embodiment of a process continuing from FIG. **21**.

[0033] FIG. **23** is a data flow diagram showing an embodiment of a process continuing from FIG. **22**.

[0034] FIG. **24** is a data flow diagram showing an embodiment of a process continuing from FIG. **23**.

[0035] FIG. **25** is a data flow diagram showing one embodiment, among others, of the flow of data between the various system components of FIG. **2** when a callee forwards an incoming call from a caller to another telephone number, as shown in FIG. **18**.

[0036] FIG. **26** is a data flow diagram showing an embodiment of a process continuing from FIG. **20**.

[0037] FIG. **27** is a data flow diagram showing another embodiment, among others, of the flow of data between the various system components of FIG. **2** when a callee answers an incoming call from a caller on hold, as shown in FIGS. **18** and **19**.

[0038] FIG. **28** is a data flow diagram showing an embodiment of a process continuing from FIG. **27**

[0039] FIG. **29** is a diagram showing an embodiment of a user interface that can be presented to a user during the process shown in FIGS. **18** through **28**.

[0040] FIG. **30** is a diagram showing an embodiment of another user interface that can be presented to a user during the process shown in FIGS. **18** through **28**.

[0041] FIG. **31** is a diagram showing an embodiment of another user interface that can be presented to a user during the process shown in FIGS. **18** through **28**.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0042] Reference is now made in detail to the description of the embodiments as illustrated in the drawings. While several embodiments are described in connection with these drawings, there is no intent to limit the disclosure to the embodiment or embodiments disclosed herein. On the contrary, the intent is to cover all alternatives, modifications, and equivalents.

[0043] Unlike many known systems and methods associated with unified messaging, the approaches presented herein provide systems and methods for integrating different communication modalities without substantially modifying existing communication systems. In some embodiments, among others, the integration is accomplished through a messaging server that provides the interface between the various communication modalities. Thus, rather than modifying the operation of the different modalities and constructing a new integrated system, the messaging server converts communications from one communication modality to another, thereby providing a simpler approach to integrating different communication modalities. As non-limiting examples, the communication modalities may include public switched telephone network (PSTN) telephony, email, instant messaging (IM), Internet call waiting (ICW), satellite telephony, cellular telephony, legacy voicemail, and many more.

[0044] Thus, in some embodiments, among others, legacy voicemail systems can be integrated with Internet-based communication systems without significant modification to either the legacy voicemail systems or the Internet-based communication systems. For those embodiments, the messaging server is configured to receive Internet-based communications and convert the Internet-based communications into legacy-voicemail-compatible communications. Similarly, the messaging server, for those embodiments, is configured to convert legacy voicemail messages and commands into Internet-compatible signals.

[0045] In other embodiments, among others, Internet call waiting (ICW) systems can be integrated with legacy voicemail systems. The integration between legacy voicemail and ICW permits the ICW systems to deposit voicemail messages into the legacy voicemail systems and, also, to extract messages from the legacy voicemail systems.

[0046] In yet other embodiments, among others, the ICW systems can be configured to include digital voicemail stores that store voicemail messages that are portable over the Internet. The integration of the legacy voicemail systems with the digital voicemail stores permits synchronous storage and extraction of voicemail messages from both the legacy voicemail systems and Internet-based systems. Thus, a user can avoid the inconvenience of checking for the same message at multiple platforms.

[0047] While specific communication modalities are used to illustrate the systems and methods in the several embodiments described below, it should be appreciated that the specific embodiments are provided for illustrative purposes, and are not intended to be limiting. For example, while legacy voicemail systems and ICW systems are shown in great detail with reference to FIGS. **1** through **31**, it should be appreciated that the legacy voicemail system is an example of one communication system that is configured to communicate using a specified protocol. Since legacy voicemail systems have existed since 1979, and are known to those having skill in the art as evidenced by U.S. Pat. No. 4,371,752, the original voicemail patent issued to Matthews et al., only cursory descriptions of voicemail are provided when relevant.

[0048] Since protocols for accessing voicemail messages from legacy voicemail systems are relatively well-established, it should be appreciated that the protocol associated with legacy voicemail is an example of a standard communication protocol. Likewise, it should be appreciated that the ICW system is an example of another communication system that is configured to communicate using a different specified protocol. In that regard, the established protocol associated with ICW is an example of another standard communication protocol. Specifically, with reference to ICW, the protocol may include both Internet-based protocols and PSTN-telephony-based protocols, since ICW has both an Internet component and a PSTN component.

[0049] FIG. **1** is a block diagram showing component architecture for a computer, which can be one embodiment, among others, of a callee client **202** that interfaces a user (not shown) to multiple communication modalities. As shown in FIG. **1**, the callee client **202** includes a processor **105** and memory **110**, which are both electrically coupled to a local interface (or bus) **125**. The callee client **202** of FIG. **1** also includes a network interface **145** coupled to the bus **125**. The network interface **145** permits the callee client **202** to communicate across a network (not shown in FIG. **1**) with other network devices (not shown in FIG. **1**) that may be communicatively coupled to the network.

[0050] In some embodiments, the callee client **202** can also include input/output (I/O) devices **140** such as a keyboard, mouse, monitor, or other known I/O devices. Additionally, the callee client **202** can include a local storage device **135** such as, for example, a hard disk. Moreover, the callee client **202** can also include expansion slots **130** to accommodate, for example, plug-and-play devices or peripheral component interconnect (PCI) devices. Since I/O devices **140**, local storage devices **135**, and expansion slots **130** are known to those having skill in the art, further discussion of these components is omitted here. Additionally, since the interaction among these components within a computer are known to those of skill in the art, further discussion of the internal computer architecture is omitted here.

[0051] In one embodiment, among others, the memory **110** includes the operating system **115** and an Internet call waiting (ICW) client application **120**. The ICW client application **120** enables the callee client **202** to handle incoming telephone calls to a particular public switched telephone network (PSTN) line when a modem a user is accessing a dial-up Internet service over the same PSTN line. Conventional ICW applications are known to those having skill in the art, as evidenced by U.S. Pat. No. 5,805,587, having the title "Call Notification Feature for a Telephone Line Connected to the Internet" by Norris et al., which is incorporated herein by reference in its entirety. Hence further discussion of conventional ICW applications is omitted here.

[0052] The ICW client application **120** of FIG. **1**, however, unlike conventional ICW applications, provides a setup "wizard" that streamlines the setup process with minimal user input. An example embodiment, among others, of the setup wizard are shown with reference to FIGS. **3** through **15** below.

[0053] Once a user has set up the ICW application **120** and logged in at the callee client **202** using a dial-up connection over a PSTN telephone line, the ICW application **120** provides various alerts and/or notifications to the user, thereby apprising the user of incoming telephone calls over the same PSTN telephone line. As described below with reference to FIGS. **16** through **31**, the user can provide one or more responses to the alerts and/or notifications, which, in turn, results in a different handling of the incoming telephone call. Unlike standard systems, however, the handling of the calls, in some embodiments, involves multiple communication modalities with different communication protocols. Specifically, multiple communication modalities are accessed without substantially altering the communication protocols for those communication modalities. In a preferred embodiment, among others, the communication protocols and communication systems are left undisturbed, thereby preserving the stability of the underlying communication systems and the robustness of the communication protocols. Rather than altering known systems and protocols, an additional translator interfaces the undisturbed communication systems and translates between the known protocols.

[0054] As described below, in some embodiments, the translator is implemented as a messaging server that is communicatively coupled to the various communication systems. The messaging server is configured to receive data and/or commands using one protocol for one communication system and convert the data/commands into another protocol for another communication system. By having such a messaging server, multiple communication modalities can be integrated in a modular fashion. Thus, in the future, if additional communication modalities are developed, those communication modalities can be seamlessly integrated with the existing communication modalities by reconfiguring the messaging server to accommodate the new communication modality. In other words, rather than reconstructing an entire communication system, as in some unified messaging systems, the different communication modalities can be integrated by modifying the messaging server. An embodiment of a system having a messaging server is shown with reference to FIG. **2**, while embodiments of the operation of the messaging server are shown with reference to FIGS. **16** through **31**.

[0055] FIG. **2** is a block diagram showing various system components associated with multiple communication modalities. As shown in FIG. **2**, one embodiment, among others, includes a public switched telephone network (PSTN) **204**, an advanced intelligent network (AIN) intranet **220**, a messaging network intranet **228**, and the Internet **216**, which are networks that are familiar to those having skill in the art. As known in the art, the AIN intranet **220** can include an Internet gateway **222**, which facilitates communications between the AIN intranet **220** and various Internet-compatible components. The Internet gateway **222** is also communicatively coupled to the SCP **224**, thereby effectively providing a communication pathway between the SCP **224** and various Internet-based communication systems.

[0056] As further known to those having skill in the art, the PSTN **204** can include a caller central office (CO) **208** and a callee CO **206**, which are communicatively coupled to a caller telephone **210** and the callee client **202**, respectively. The callee CO **206** and the caller CO **208** are communicatively coupled to each other, thereby providing a communication connection between a caller at the caller telephone **210** and a callee at the callee client **202**. Since the operating

protocols of the PSTN **204** are known in the art, only a truncated discussion of the PSTN **204** components is provided when appropriate.

[**0057**] In addition to these (and possibly other) networks, the embodiment of FIG. **2** includes various components such as, for example, a lightweight directory access protocol (LDAP) database **232** and a legacy voicemail repository **230** (also referred to as a legacy voicemail mailbox), which are both communicatively coupled to the messaging network intranet **228**. The legacy voicemail repository **230**, in some embodiments, is a component part of an entire legacy voicemail system. Since LDAP databases **232** and legacy voicemail systems are known in the art, only a truncated discussion of these components is provided when appropriate.

[**0058**] The callee CO **206** and the caller CO **208** are communicatively coupled to an SS7 network **212**, which uses a signaling system 7 (SS7) telephony protocol, as known in the art. The SS7 network **212** is communicatively coupled to a service control point (SCP) **224**. Since the SS7 telephony protocol and the operation of the SCP **224** are known in the art, only a truncated discussion of SS7 network **212** and the SCP **224** is provided when appropriate.

[**0059**] So far, with the exception of the callee client **202**, the components discussed above with reference to FIG. **2** are standard network components. In various embodiments, the standard components are substantially unmodified. In this regard, throughout this disclosure, the term "standard" implies that the system, protocol, modality, or other component operates in accordance with known standards and protocols, with little or no modification. Since these standard systems, protocols, modalities, and/or other components and their respective operations are known to those having skill in the art, only cursory descriptions of the standard systems, protocols, modalities, and/or components are provided when relevant. Also, it is intended that "standard" encompass any future technologies that may be adopted as a standard or convention.

[**0060**] In a preferred embodiment, among others, the standard components are wholly unaltered, thereby maintaining the inherent stability and robustness of these components. Thus, for some embodiments, the caller CO **208**, the callee CO **206**, SS7 network **212**, the SCP **224**, the caller telephone **210**, the AIN intranet **220**, the messaging network intranet **228**, the Internet gateway **222**, the PSTN **204**, the legacy voicemail repository **230**, and the LDAP database **232** operate without any modifications to their communication protocols.

[**0061**] In addition to the standard components, some embodiments, among others, include an internet Internet call waiting (ICW) service package application (SPA) **226**, which is a corresponding server component to the ICW client application **120** of FIG. **1**. The ICW SPA **226** is communicatively coupled to the SCP **224**. The ICW SPA **226** is configured to receive various requests from the ICW client application **120**. For example, when the callee client **202** receives an incoming telephone call while a user is logged onto a dial-up Internet connection, the ICW client application **120** prompts the user to dispose of the incoming telephone call by providing one or more selections to the user. In response to the user's input, the ICW client application **120** issues one or more requests to the ICW SPA **226**. The ICW SPA **226** then issues instructions (or commands) to the SCP **224**, which correspond to the request by the ICW client application **120**. The SCP **224**, in response to the instructions from the ICW SPA **226**, conveys the instructions to the callee CO **206** so that the callee CO may dispose of the telephone call in an appropriate manner. Various embodiments of the call disposition are shown with reference to FIGS. **16** through **31**.

[**0062**] The call dispositions are also handled by a network access server (NAS) **218** in conjunction with the callee CO **206**. In some embodiments, the NAS **218** also provides session initiation protocol (SIP) server **218** capabilities. Thus, FIG. **2** shows a single NAS/SIP server **218**, rather than separating the two conceptually distinct server functions. However, for convenience, the NAS/SIP server **218** is referred to herein simply as the NAS **218**.

[**0063**] The NAS **218** includes an analog communications port that is coupled to both the caller CO **208** and the callee CO **206**. In some embodiments, the analog communications port is configured as a voice port for transmitting and receiving analog voice signals. The analog communications port permits the NAS **218** to receive analog voice signals from, and transmit analog voice signals to, the caller CO **208** and the callee CO **206**. The NAS **218** is also communicatively coupled to the DMS **214** through the Internet **216**, thereby permitting communication between the caller CO **208** and the DMS **214** through NAS **218** and the Internet **216**. In addition to the analog voice communications port, the NAS **218** also includes a digital voice communications port. The digital voice communications port is coupled to the Internet **216**, thereby permitting digital communications between the NAS **218** and other components that may be connected to the Internet **216**. Since the NAS **218** is amenable to both digital and analog communications, the NAS **218** includes both digital-to-analog (D/A) conversion capabilities as well as analog-to-digital (A/D) conversion capabilities. Since various D/A and A/D conversion approaches are known in the art, further discussion of D/A and A/D is omitted here.

[**0064**] In addition to the ICW SPA **226** and the NAS **218**, the embodiment of FIG. **2** further includes a digital messaging server (DMS)/SIP server **214**. For convenience, the DMS/SIP server **214** is referred to herein simply as "DMS"**214**. The DMS **214** is communicatively coupled to both the Internet **216** and the legacy voicemail repository **230** (also referred to simply as legacy VM). In one embodiment, among others, the DMS **214** is coupled to the legacy VM **230** through the messaging network intranet **228**.

[**0065**] The DMS **214**, in some embodiments, among others, is configured to generate a temporary digital mailbox, which provides a convenient holding space for digital messages as they are being conveyed from one communication system to another communication system. In a preferred embodiment, among others, the DMS **214** is configured to generate a temporary digital voicemail store that stores a digital voicemail message for further processing.

[**0066**] For those embodiments in which the DMS **214** generates a digital voicemail store, a mechanism exists for correlating a callee's telephone number and the callee's Internet address. Thus, when a user's Internet connection prematurely disconnects prior to conveying the digital voicemail message to the callee client **202**, it is possible that

a new Internet address is assigned to the callee when the callee reconnects to the Internet. Thus, it is possible that a particular digital voicemail message may be associated with a constantly-changing Internet address. As one can see, this becomes problematic when the digital voicemail message is to be delivered to a particular callee client **202** over the Internet **216**, and the Internet address of the callee client **202** may vary over time.

[**0067**] In order to remedy this problem, when a digital voicemail message is stored in the temporary digital voicemail store, that digital voicemail message should be correlated to a stationary or non-varying reference. In a preferred embodiment, among others, that non-varying reference may be a user's 10-digit telephone number. Since the user's 10-digit telephone number will be constant regardless of the Internet address from which the user logs in, by correlating the digital voicemail message to the user's 10-digit telephone number, that digital voicemail message can be delivered to the user's callee client **202** regardless of how often the Internet address may change.

[**0068**] Thus, in operation, the DMS **214** receives a digital voicemail message that is directed to a particular recipient. Substantially synchronously, the DMS **214** creates a digital voicemail store to store the digital voicemail message. The 10-digit telephone number (or other non-varying information) is incorporated into the digital voicemail store to identify the digital voicemail store as belonging to the recipient.

[**0069**] Once the digital voicemail message has been downloaded to the callee client, as described, for example, in FIG. **26**, the digital voicemail store may be destroyed or deleted in order to free up storage space on the DMS **214**. In other words, the digital voicemail store, in some embodiments, appear and disappear as needed, thereby conserving storage space at the server. This type of appearing/disappearing temporary digital voicemail store provides a streamlined approach to conveying messages from one communication system to another communication system.

[**0070**] The DMS **214**, in conjunction with the NAS **218**, converts signals (e.g., messages, commands, etc.) from one communication protocol to another communication protocol. For example, the DMS **214** and the NAS **218** can be configured to convert analog signals, which originate from the PSTN **204**, to digital signals, which are conveyed to various Internet-compatible systems. In one specific example, the NAS **218** may receive an analog voice signal from the caller CO **208** and digitize the analog voice signal. The digitized signal may then be conveyed to the DMS **214** with an indication that the digitized signal originated from the caller CO **208**. The DMS **214** may receive the digitized signal from the NAS **218** and, upon receiving the signal and the appropriate indication of origin, convert the digitized signal into various Internet-compatible data, such as, for example, an attachment to an email message, an attachment to an instant messaging (IM) message, a digital voice stream using voice-over-Internet protocol (VoIP), or a variety of other Internet-compatible data streams. If the digitized signal is converted to VoIP data stream, then the VoIP data stream can subsequently be stored in a digital voicemail store and/or transmitted in near real-time over the Internet **216**. If the digitized signal is attached to an email message, then the email message can subsequently be transmitted to an email recipient. Similarly, if the digitized signal can be transmitted over IM, in accordance with known IM protocols. FIGS. **16** through **31** show embodiments that employ Internet call waiting (ICW). Thus, FIGS. **16** through **31** shows an example of integration between PSTN-telephony-based protocols and known ICW protocols.

[**0071**] FIGS. **3** through **7** are flowcharts showing an embodiment of a process for setting up a user interface at the computer of FIG. **1**, while FIGS. **8** through **15** are diagrams showing embodiments of user interfaces that can be presented to a user during the setup process of FIGS. **3** through **7**. The user interface (not shown) provides an interface for accessing multiple communication modalities. In some embodiments, the multiple communication modalities can be accessed substantially synchronously. The embodiment of FIGS. **3** through **15** provide a streamlined approach to setting up the ICW client application **120** with very little user input. In other words, the setup process is mostly automated, thereby reducing potential user error.

[**0072**] As shown in FIG. **3**, upon loading installation (or setup) software for ICW onto a user's computer (or the callee client **202**), the ICW setup software is launched (**302**). Upon launching (**302**) the ICW setup software, a message is displayed (**304**) to the user to indicate that the system settings are being checked. The indication may appear similar to the display shown in FIG. **8**.

[**0073**] Upon displaying (**304**) the message, the callee client **202** determines (**306**) whether or not the modem line attached to the callee client **202** is being used. If the callee client **202** determines (**306**) that the modem line (i.e., the PSTN telephone line connected to the modem) is being used, then the callee client **202** displays (**308**) an error message indicating that the modem line is in use. That error message **1002** may appear similar to that shown in FIG. **10**, which requests the user to acknowledge the error message. The callee client **202** waits for a user input and, in response to receiving (**309**) the user input, displays (**310**) an exit confirmation screen **902** similar to that shown in FIG. **9**. The exit confirmation screen **902** provides a selection **904** to exit and, also, a selection **906** to not exit. When the user provides a selection, the callee client **202** receives (**312**) the selection and determines (**314**) whether or not the user has chosen to exit the setup process. If the user has chosen to exit the setup process, then the setup process ends. If, however, the user has chosen not to exit the setup process (e.g., the modem line has been relinquished and the user wishes to continue the setup), then the callee client **202** again displays (**304**) the message indicating that system settings are being checked, and the process repeats itself.

[**0074**] If the callee client **202** determines (**306**) that the modem line is not in use, then the callee client **202** further determines (**316**) whether or not a termination attempt trigger (TAT) for ICW is provisioned on the modem line. If the callee client **202** determines (**316**) that the TAT for ICW is not provisioned on the modem line, then the callee client **202** displays (**318**) an error message indicating that ICW is not provisioned on the modem line. In some embodiments, the error message **1102** may be similar to that shown in FIG. **11**. Upon displaying (**318**) the error message, the process ends. If the callee client **202** determines (**316**) that the modem line is provisioned with the TAT for ICW, then the process continues to FIG. **4**.

[0075] As shown in FIG. **4**, the callee client **202** further determines (**402**) whether or not call waiting is available on the modem line. If the callee client **202** determines (**402**) that call waiting is available on the modem line, then the callee client **202** stores (**404**) information, which reflects that call waiting is available on the modem line. This information is later used when setting up the dial string for dial-up access to various Internet service providers (ISPs).

[0076] If the callee client **202**, however, determines (**402**) that call waiting is not available on the modem line, then the callee client **202** stores (**404**) information, which reflects that call waiting is not available on the modem line. This information is later used when setting up the dial string for dial-up access to various Internet service providers (ISPs). Then the callee client **202** further determines (**406**) whether or not dial access is configured on the modem line. In other words, the callee client **202** determines (**406**) whether or not the user has provided dial-up information for one or more ISPs. This is done, in some embodiments, by accessing registry information on the callee client **202**, which is indicative of the various system settings for the callee client **202**. Upon accessing the registry settings, if the callee client **202** determines (**406**) that no dial-up information has been provided, then the callee client **202** stores (**408**) information indicating that no dial access is configured. This information is subsequently used to provide an interface for the user to input dial-up information and for updating the registry.

[0077] If the callee client **202** determines (**406**) that dial access is configured, then the callee client **202** further determines (**410**) whether more than one dial access number is available. More than one dial access number may be available if the user is a subscriber to more than one ISP. If the callee client **202** determines (**410**) that more than one dial access number is available, then that information is stored (**414**). Conversely, if the callee client **202** determines (**410**) that only one dial access number is available, then that information is stored (**412**). Upon storing (**412** or **414**) the appropriate information, the process continues to FIG. **5**.

[0078] As shown in FIG. **5**, an opening page **1202**, similar to that shown in FIG. **12**, is displayed (**502**) to the user at the callee client **202**. In some embodiments, the opening page **1202** includes an option **1206** to cancel the setup process and, also, an option **1204** to continue the setup process. When the user selects one of the options, the callee client **202** receives (**504**) the user input and determines (**506**) whether or not the setup process should continue. If the callee client **202** determines (**506**) that the setup process should not continue, then the callee client **202** prompts the user to confirm the cancellation and determines (**508**) whether or not to exit the setup process. The prompt may be provided at a user interface **902** similar to that shown in FIG. **9**. If the termination of the setup process has been confirmed, then the setup process ends. However, if the termination of the setup process has not been confirmed, then the callee client **202** displays (**502**) the opening page **1202**, and the process repeats from the displaying (**502**) of the opening page.

[0079] If the callee client **202** determines (**506**) that the setup process should continue, then an end-user license agreement (EULA) **1302**, similar to that shown in FIG. **13**, is displayed (**510**) to the user. The EULA **1302** provides a selection **1304** to either accept the terms of the EULA **1302** or decline the terms of the EULA **1302**. When the user provides a selection, the callee client **202** receives (**512**) the selection and determines (**514**), from the selection, whether or not the user has accepted the terms of the EULA **1302**.

[0080] If the user has not accepted the terms of the EULA **1302**, then a notice is displayed (**516**) to the user, which indicates that the user must accept the terms of the EULA **1302** in order to install the product. Thereafter, the callee client **202** receives (**518**) input, which indicates whether or not the user wishes to continue the setup process. In response to the user input, the callee client **202** determines (**520**) whether or not the process should continue. If the callee client **202** determines that the process should continue, then the EULA **1302** is, again, displayed (**510**) to the user, and the process continues from the displaying (**510**) of the EULA **1302**. If the callee client **202** determines (**520**) that the user has chosen to exit the setup, then the callee client **202** displays (**522**) the exit confirmation screen **902** and, again, receives (**524**) a user's selection. Thereafter, the callee client **202** determines (**526**) whether or not the user has confirmed the termination of the setup process. If the user has confirmed the termination of the setup process, then the setup process ends. If, however, the user has not confirmed the termination of the setup process, then the EULA **1302** is, again, displayed (**510**) to the user, and the process continues from the displaying (**510**) of the EULA **1302**.

[0081] When the EULA **1302** has been displayed (**510**) to the user, and callee client **202** determines (**514**) that the user has accepted the terms of the EULA **1302**, then the process continues to FIG. **6**. As shown in FIG. **6**, the callee client **202** displays (**602**) an input screen **1402** for call-forwarding telephone numbers, similar to that shown in FIG. **14**. As shown in FIG. **14**, the input screen **1402** includes input areas **1404***a* . . . **1404***e* for names and, also, corresponding input areas **1406***a* . . . **1406***e* for telephone numbers that correspond to the names.

[0082] When the user provides those numbers, the callee client **202** receives (**604**) the call-forwarding telephone numbers and stores (**606**) the numbers. Thereafter, the callee client **202** determines (**608**) whether or not the stored information from FIG. **4** reflects that dial access has been provisioned. If the stored information reflects that no dial access numbers are available, then the callee client **202** queries (**610**) the user for one or more dial access numbers. When the user provides the dial access number(s), the callee client **202** receives (**612**) those numbers, and the process continues to FIG. **7**. If the stored information reflects that one or more dial access numbers are available, then the process continues directly to FIG. **7**.

[0083] As shown in FIG. **7**, the callee client **202** determines (**702**) whether or not the stored in formation from FIG. **4** reflects that only one dial access number is available. If the information reflects that only one dial access number is available, then the callee client further determines (**704**) whether the stored information from FIG. **4** reflects that call waiting is available on the modem line. If call waiting is available on that line, then a duplicate dial string is provisioned (**706**) with both ICW and call-waiting-cancellation feature codes. Thereafter, a message **1502**, similar to that shown in FIG. **15**, is displayed (**716**), which indicates that the setup process is complete, and the ICW client application

120 is then launched (**718**) at the callee client **202**. Once the ICW client is launched (**718**) the process continues to FIG. **16**.

[**0084**] If the information reflects that only one dial access number is available and call waiting is not available on the modem line, then a duplicate dial string is provisioned (**708**) with only the ICW feature code. Thereafter, a message **1502**, similar to that shown in FIG. **15**, is displayed (**716**), which indicates that the setup process is complete, and the ICW client application **120** is then launched (**718**) at the callee client **202**. Once the ICW client is launched (**718**) the process continues to FIG. **16**.

[**0085**] If the information reflects that more than one dial access number is available, then the callee client further determines (**710**) whether the stored information from FIG. **4** reflects that call waiting is available on the modem line. If call waiting is available on that line, then duplicate dial strings for all of the stored numbers are provisioned (**712**) with both ICW and call-waiting-cancellation feature codes. Thereafter, a message **1502**, similar to that shown in FIG. **15**, is displayed (**716**), which indicates that the setup process is complete, and the ICW client application **120** is then launched (**718**) at the callee client **202**. Once the ICW client is launched (**718**) the process continues to FIG. **16**.

[**0086**] If the information reflects that more than one dial access number is available and call waiting is not available on the modem line, then duplicate dial strings for all of the stored numbers are provisioned (**714**) with only the ICW feature code. Thereafter, a message **1502**, similar to that shown in FIG. **15**, is displayed (**716**), which indicates that the setup process is complete, and the ICW client application **120** is then launched (**718**) at the callee client **202**. Once the ICW client is launched (**718**) the process continues to FIG. **16**.

[**0087**] FIGS. **16** and **17** are data flow diagrams showing one embodiment, among others, of the flow of data between the various system components of FIG. **2** for Internet call waiting (ICW), while FIGS. **29** through **31** are diagrams showing embodiments of user interfaces that can be presented to a user during the process shown in FIGS. **18** through **28**. Specifically, FIG. **16** is a data flow diagram showing a connection to the Internet from a callee client **202** with the ICW client application **120** installed, and FIGS. **17** and **18** are data flow diagrams showing ICW processes upon receiving an incoming telephone call.

[**0088**] As shown in FIG. **16**, upon launching the ICW client application **120**, the callee client **202** conveys (**1602**) the dial string with one or more feature codes to the callee central office (CO) **204**. The callee CO **204** receives (**1604**) the dial string with the feature code(s) and fires (**1606**) a termination attempt trigger (TAT) wakeup for Internet call waiting (ICW) to the advanced intelligent network (AIN) **220**. Additionally, the callee CO **208** establishes (**1608**) a connection with the digital communication port on the network access server (NAS) **218**. In some embodiments, the digital communication port is configured as a data port for receiving and transmitting digital data. The NAS **218** subsequently establishes (**1610**) a connection to the Internet **216**. Thus, at the end of FIG. **16**, a user has established a dial-up connection to the Internet. Additionally, at the end of FIG. **16**, TAT for ICW has been activated.

[**0089**] It should be appreciated, after the ICW client application **120** has been properly set up and configured, that for some embodiments, the ICW client application **120** may be launched automatically during startup without additional user intervention. In other embodiments, the ICW client application **120** may be launched manually in response to user input.

[**0090**] When a caller places a telephone call to the callee (from either a public switched telephone network (PSTN) telephone or a cellular telephone), that call is ultimately routed to the callee CO **204** through known mechanisms. As shown in FIG. **17**, the caller CO **208** receives (**1702**) the dialed number of the callee from the caller and conveys (**1704**) the dialed number to the callee CO **204**. The callee CO **204** receives (**1706**) the dialed number and determines (**1708**) whether a TAT for ICW is present on the callee line. If the TAT for ICW is not present, then the call is connected (**1710**) and the process ends. If, however, the TAT for ICW is present, then the callee CO **204** queries (**1712**) the AIN **220** with the dialed telephone number, and the process continues to FIG. **18**.

[**0091**] As shown in FIG. **18**, the AIN **220** conveys (**1802**) the caller information to the callee client **202** through the callee CO **204**. The callee client **202** receives (**1804**) the caller information and displays (**1808**) the caller information at a caller information user interface **2902**, such as that shown in FIG. **29**. As shown in FIG. **29**, in some embodiments, the caller information user interface **2902** includes the caller's name **2904** and the caller's telephone number **2906**. The callee client **202** also sets (**1806**) a timer, which tracks the amount of time that elapses from the receiving (**1804**) of the caller information. In addition to the caller information, the callee client **202** provides (**1810**) call disposition options to the callee through a call disposition user interface **3002**, such as that shown in FIG. **30**. As shown in FIG. **30**, the call disposition user interface **3002** includes the caller name **3004** and the caller number **3006**. Additionally, the call disposition user interface **3002** includes call disposition options, such as, for example, options to answer the call **3014** (hereinafter "the answer option"), send the call to another number **3016** (hereinafter "the forward option"), request the caller to hold **3018** (hereinafter "the hold option"), or direct the telephone call to voicemail **3020** (hereinafter "the voicemail option"). Also, the call disposition user interface **3002** includes additional options such as, for example, an option to view a call log **3008**, an option to manage the ICW client application **3010**, and an option to view a help screen **3012**.

[**0092**] When a user selects one of the call disposition options **3014**, **3016**, **3018**, **3020**, the callee client **202** receives the user's selection. If the user has selected the hold option **3018**, then the process continues to FIG. **19**. If the user has selected the voicemail option **3020**, then the process continues to FIG. **20**. If the user has selected the forward option **3016**, then the process continues to FIG. **25**. If the user has selected the answer option **3014**, then the process continues to FIG. **27**.

[**0093**] FIGS. **19**, **20** through **24**, and **26** are data flow diagrams showing one embodiment, among others, of the flow of data between the various system components of FIG. **2** when a callee places a caller on hold, as shown in FIG. **18**. As shown in FIG. **19**, the callee client **202** receives (**1902**) the input to hold the call from the user. Upon receiving (**1902**) the input to hold the call, the callee client **202** sets

(**1904**) a hold timer and displays (**1906**) a countdown that corresponds to the elapsing of time on the hold timer. In some embodiments, among others, the display may be a user countdown user interface **3102**, such as that shown in FIG. **31**. As shown in FIG. **31**, the countdown user interface **3102** displays a caller name **3104** and a caller number **3106**. Additionally, the countdown user interface **3102** displays a countdown timer **3118** that indicates the amount of time that a user has to answer the held telephone call before the held telephone call expires. The countdown user interface **3102** also includes a call answer selection **3114** that allows the callee to answer the held telephone call any time before the countdown timer **3118** expires. The countdown user interface **3102** can also include additional options such as, for example, an option to view a call log **3108**, an option to manage the ICW client application **3110**, and an option to view a help screen **3112**.

[**0094**] Once the hold timer is set (**1904**) and the countdown is displayed (**1906**), the callee client **202** issues (**1908**) a request to the AIN **220** to hold the incoming telephone call for a predefined time interval. In some embodiments, the predefined time interval may be 150 seconds. It should, however, be appreciated that the predefined time interval may be adjusted, as desired. The AIN **220** receives (**1910**) the request and generates (**1912**) a message requesting the caller to hold. That message is, preferably, an audio message that is played in near real time to the caller through the PSTN **204**. Thus, in operation, the message is conveyed (**1914**) to the caller CO **208** through the callee CO **204**. The caller CO **208** receives (**1916**) the message and relays (**1918**) the message to the caller at the caller telephone **210**. As the caller is holding, if the user selects the call answer selection **3114**, then the process continues to FIG. **27**. Alternatively, if the hold timer expires, then the process continues to FIG. **20**.

[**0095**] As shown in FIG. **20**, when the hold timer expires (or when the callee client **202** receives input to send the call to voicemail), the callee client **202** sets (**2004**) a polling clock. Upon setting the polling clock, the callee client **202** issues (**2006**) a request the AIN **220** to send the held call to voicemail. The AIN **220** receives (**2008**) the request and issues (**2010**) instructions to the callee CO **204** to send the call to NAS **218**. The callee CO **204** receives (**2012**) the instructions and releases (**2014**) the call. Substantially synchronous with the releasing (**2014**) of the call, the callee CO **204** facilitates (**2016**) the establishing of a connection between the caller CO **204** and the analog voice communication port of the NAS **218**. Specifically, the callee CO **204** dials the analog voice port of the NAS **218**, relays the connection to the caller CO **208** through a switch-hook-flash, as is known in the art, and disconnects after establishing the connection between the NAS **218** and the caller CO **208**. The process then continues to FIG. **21**.

[**0096**] As shown in FIG. **21**, upon establishing (**2016**) a connection with the analog voice communication port, the NAS **218** further establishes (**2102**) a session initiation protocol (SIP) session with the digital messaging server (DMS) **214** over the Internet **216**. Since SIP is known by those having skill in the art, further discussion of the specifics of SIP is omitted here. Upon establishing (**2102**) the SIP session with the DMS **214**, the NAS generates (**2104**) an indication of the call connection. This indication is conveyed (**2106**) to the DMS **214** over the Internet **216**. The DMS **214** receives (**2108**) the indication and generates (**2110**) a prompt to the caller to "leave a message." That prompt is conveyed (**2112**) to the caller CO **208** over the Internet **216** and through the NAS **218**. The caller CO **208** receives (**2114**) the prompt and conveys (**2116**) the prompt to the caller. In one embodiment, among others, the prompt to the caller is played in real time over the Internet **216** and the PSTN **204**. In some embodiments, the prompt is generated as digital data, conveyed from the DMS **214** to the NAS **218** as digital data, converted to analog signals by the NAS **218**, and conveyed from the NAS **218** to the caller CO **208** as analog signals. Once the prompt is played to the caller, the process continues in FIG. **22**.

[**0097**] As shown in FIG. **22**, in response to the prompt from the AIN **220**, the caller records a message for the callee. In operation, the caller CO **208** receives (**2202**) the analog voice stream from the caller and conveys (**2204**) the analog voice stream to the analog voice communication port of the NAS **218**. The NAS **218** receives (**2206**) the analog voice stream and digitizes (**2208**) the analog voice stream. The digitized voice stream is conveyed (**2210**) from the digital communication port of the NAS **218** to the DMS **214** via the Internet **216**. The DMS **214** receives (**2212**) the digitized voice stream and stores (**2214**) the digitized voice stream as a digital voicemail message. The process continues in FIG. **23**.

[**0098**] As shown in FIG. **23**, upon storing (**2214**) the digitized voice stream, the DMS **214** queries the lightweight directory access protocol (LDAP) database **232** to determine whether the callee is a subscriber to a legacy voicemail system. In operation, the querying process may be seen as beginning with a generating (**2302**) of a query for callee information. The DMS **214** conveys (**2304**) the query to the lightweight directory access protocol (LDAP) database **232**. The LDAP database **232** receives (**2306**) the query. It is then determined (**2308**) whether or not the callee is a subscriber to a legacy voicemail system. In other words, it is determined whether or not the callee has a legacy voicemail repository. If the callee does not have a legacy voicemail repository, then the process ends. If, however, the callee has a legacy voicemail repository, then the process continues to FIG. **24**.

[**0099**] As shown in FIG. **24**, the callee information is returned (**2402**) from the LDAP database **232** to the DMS **214**. The DMS **214** receives (**2404**) the callee information and converts (**2406**) the digital voicemail message into an analog voicemail message using voice profile for Internet mail (VPIM). Since VPIM is described in RFC 2421, RFC 2422, RFC 2423, and RFC 2424, published by the Internet Engineering Task Force (IETF), further discussion of VPIM is omitted here. However, it should be appreciated that the digital voicemail message can also be converted into an analog voicemail message using other proprietary and/or non-proprietary techniques.

[**0100**] The DMS **214** conveys (**2408**) the analog voicemail message to the legacy voicemail repository **230**. The legacy voicemail repository **230** receives (**2410**) the analog voicemail message and stores (**2412**) the analog voicemail message. As shown in FIGS. **21** through **24**, the voicemail message from the caller is stored at both the DMS **214**, in digital format, and at the legacy voicemail repository **230**, in accordance with the protocols of the legacy voicemail system. Specifically, in the embodiment of FIGS. **21** through

24, both the digital and analog voicemail messages are stored substantially synchronously because the NAS performs a near-real time digital-to-analog and analog-to-digital conversion.

[0101] Once the analog voicemail message is stored at the legacy voicemail repository, and the digital voicemail message is stored at the DMS 214, the voicemail messages can be retrieved. FIG. 26 shows an embodiment in which the stored digital voicemail message in the DMS 214 is retrieved by the callee client 202. As shown in FIG. 26, when the polling clock from FIG. 20 expires, the callee client 202 polls (2602) the DMS 214, via the Internet 216, for new digital voicemail messages. If the DMS 214 has any new digital voicemail messages, then the DMS 214 sends (2604) those digital voicemail messages to the callee client 202 over the Internet 216. The callee client 202 receives (2606) the digital voicemail messages and issues (2608) an acknowledgement back to the DMS 214 when the voicemail message is completely received (or downloaded). The DMS 214 receives (2610) the acknowledgement and, in response to the acknowledgement, expunges (2616) the digital voicemail message. After issuing (2608) the acknowledgement, the callee client 202 generates (2612) an alert to the user, thereby indicating the retrieval of a new digital voicemail message. The callee client 202 then logs (2614) the new voicemail message and, thereafter, the process terminates.

[0102] As shown in FIG. 27, the callee client 202 receives (2702) an input to answer the call. Upon receiving (2702) the input, the callee client 202 issues (2704) a request to the AIN 220 to answer the call. The AIN receives (2706) the request. Substantially synchronous with the issuing (2704) of the request to answer the telephone call, the callee client 202 issues (2708) instructions to the callee CO 204 to disconnect the dial-up Internet session. The callee CO 204 receives (2710) the instructions and, in response to the instructions, the dial-up Internet connection is disconnected (2712). The process then continues to FIG. 28.

[0103] As shown in FIG. 28, the AIN 220 issues (2802) instructions to the callee CO 204 to release the call from the caller. The callee CO 204 receives (2804) the instructions and releases (2806) the telephone call, thereby connecting the caller with the callee in accordance with known methods. Thereafter, the process terminates. Since the operation of the system in response to the user's selection to answer the telephone call is known in the art, further discussion of the operation of the callee CO 204, the AIN 220, and the callee client 202 is omitted with reference to FIGS. 27 and 28.

[0104] FIG. 25 is a data flow diagram showing one embodiment, among others, of the flow of data between the various system components of FIG. 2 when a callee forwards an incoming call from a caller to another telephone number, as shown in FIG. 18. As shown in FIG. 25, the callee client 202 receives 2502 the input to forward a call and issues (2504) a request to the AIN 220, through the callee CO 204. The request includes the forwarding number to which the telephone call should be forwarded. The AIN 220 receives (2506) the request and issues (2508) instructions to the callee CO 204 to forward the call to the forwarding number. The callee CO 204 receives (2510) the instructions and releases (2512) the call to the forwarding number. Thereafter the process terminates. Since the call forwarding process of FIG. 25 is known in the art, further discussion of the call forwarding process is omitted here.

[0105] The logic components within various system components of FIG. 2 (e.g., the callee client 202, the network access server (NAS)/session initiation protocol (SIP) server 218, the digital messaging server (DMS) 214, the Internet gateway 222, the lightweight directory access protocol (LDAP) database), the Internet call waiting (ICW) service package application (SPA)) may be implemented in hardware, software, firmware, or a combination thereof. In the preferred embodiment(s), those logic components are implemented in software or firmware that is stored in a memory and that is executed by a suitable instruction execution system. If implemented in hardware, as in an alternative embodiment, those logic components can be implemented with any or a combination of the following technologies, which are all well known in the art: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application specific integrated circuit (ASIC) having appropriate combinational logic gates, a programmable gate array(s) (PGA), a field programmable gate array (FPGA), etc.

[0106] Any process descriptions or blocks in flow charts should be understood as representing modules, segments, or portions of code which include one or more executable instructions for implementing specific logical functions or steps in the process, and alternate implementations are included within the scope of the preferred embodiment of the present invention in which functions may be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending on the functionality involved, as would be understood by those reasonably skilled in the art of the present invention.

[0107] The Internet call waiting (ICW) application 120, which comprises an ordered listing of executable instructions for implementing logical functions, can be embodied in any computer-readable medium for use by or in connection with an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions.

[0108] In the context of this document, a "computer-readable medium" can be any means that can contain, store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device. The computer-readable medium can be, for example but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, device, or propagation medium.

[0109] More specific examples (a nonexhaustive list) of the computer-readable medium would include the following: an electrical connection (electronic) having one or more wires, a portable computer diskette (magnetic), a random access memory (RAM) (electronic), a read-only memory (ROM) (electronic), an erasable programmable read-only memory (EPROM or Flash memory) (electronic), an optical fiber (optical), and a portable compact disc read-only memory (CDROM) (optical). Note that the computer-readable medium could even be paper or another suitable medium upon which the program is printed, as the program can be electronically captured via, for instance, optical scanning of the paper or other medium, then compiled, interpreted or otherwise processed in a suitable manner if necessary, and then stored in a computer memory.

[0110] Although exemplary embodiments have been shown and described, it will be clear to those of ordinary skill in the art that a number of changes, modifications, or alterations to the invention as described may be made. For example, while the NAS **218** and the SIP server **218** are shown as a single component, it should be appreciated that the functionality of the NAS **218** and the SIP server **218** may be separated into two distinct servers. Likewise, while the DMS **214** and the SIP server **214** are shown as a single component, it should be appreciated that the functionality of the DMS **214** and the SIP server **214** may be separated into two distinct components. Similarly, while the NAS/SIP server **218** and the DMS/SIP **214** are shown, conceptually, as separate distributed components in FIG. **2**, it should be appreciated that the NAS/SIP server **218** and the DMS/SIP **214** may be housed at the same physical location. Hence, the same piece of hardware may perform the functions of both the NAS **218** and the DMS **214**. In other words, it should be appreciated that the various components of FIG. **2** are shown as conceptually separate components, rather than as physically separate components.

[0111] Also, while the caller CO **208** and the callee CO **206** are conceptually shown as two separate entities, it should be appreciated that, depending on the physical location of both the caller and the callee, the caller CO **208** and the callee CO **206** may be one in the same. Moreover, while various servers (e.g., NAS/SIP server **218**, DMS/SIP **214**, etc.) are shown as being external to the Internet **216**, it should be appreciated that these servers may be a component part of the Internet **216**.

[0112] Additionally, while various embodiments are described with reference to specific, standard communication modalities, such as, for example, email, instant messaging (IM), Internet call waiting (ICW), legacy voicemail, public switched telephone network (PSTN) telephony, etc., it should be appreciated that the disclosed embodiments are intended to more clearly illustrate the operation of the systems and methods. Thus, the specifically enumerated communication systems are not intended as being limitations on the invention. In this regard, it should be appreciated that the present disclosure may be extended to cover other communication modalities, such as, for example, cellular telephony, satellite telephony, etc.

[0113] Similarly, the various known protocols, among others, associated with the communication systems are generically referred to as standard communication protocols. Thus, it should be appreciated that a known email protocol, such as, for example, post office protocol 3 (POP3), is an example of a standard communication protocol. Likewise, it should be appreciated that a known PSTN protocol is another example of a standard communication protocol. Similarly, it should be appreciated that other Internet-based protocols, such as, for example, voice-over Internet protocol (VoIP) and session initiation protocol (SIP), are yet other examples of standard communication protocols.

[0114] These, and other changes, modifications, and alterations, should therefore be seen as within the scope of the disclosure.

What is claimed is:

1. A method for storing messages in a plurality of communications modalities, comprising:

receiving a message in a first protocol;

converting the message from the first protocol to the second protocol;

storing the converted message in a temporary mailbox created for storing messages of the second protocol;

sending the converted message to a storage component associated with the second protocol; and

destroying the temporary mailbox.

2. The method of claim 1, wherein the message in a first protocol includes an analog voice signal.

3. The method of claim 1, wherein converting the message from the first protocol to the second protocol includes converting the message into a digital format.

4. The method of claim 1, wherein converting the message from the first protocol to the second protocol includes converting the message into an email format.

5. The method of claim 1, wherein converting the message from the first protocol to the second protocol includes converting the message into an Instant Messaging format.

6. The method of claim 1, wherein receiving a message in a first protocol includes receiving an analog voicemail message from a legacy voicemail server.

7. The method of claim 1, wherein a storage component associated with the second protocol includes a digital voicemail server.

8. A system for storing messages in a plurality of communications modalities, comprising:

a receiving component configured to receive a message in a first protocol;

a converting component configured to convert the message from the first protocol to the second protocol;

a storing component configured to store the converted message in a temporary mailbox created for storing messages of the second protocol;

a sending component configured to send the converted message to a storage component associated with the second protocol; and

a destroying component configured to destroy the temporary mailbox.

9. The system of claim 8, wherein the message in a first protocol includes an analog voice signal.

10. The system of claim 8, wherein converting the message from the first protocol to the second protocol includes converting the message into a digital format.

11. The system of claim 8, wherein converting the message from the first protocol to the second protocol includes converting the message into an email format.

12. The system of claim 8, wherein converting the message from the first protocol to the second protocol includes converting the message into an Instant Messaging format.

13. The system of claim 8, wherein receiving a message in a first protocol includes receiving an analog voicemail message from a legacy voicemail server.

14. The system of claim 8, wherein a storage component associated with the second protocol includes a digital voicemail server.

15. A computer readable medium for storing messages in a plurality of communications modalities, the computer readable medium comprising instructions that, when executed on a computer, cause the computer to:

receive a message in a first protocol;

convert the message from the first protocol to the second protocol;

store the converted message in a temporary mailbox created for storing messages of the second protocol;

send the converted message to a storage component associated with the second protocol; and

destroy the temporary mailbox.

16. The computer readable medium of claim 15, wherein the message in a first protocol includes an analog voice signal.

17. The computer readable medium of claim 15, wherein converting the message from the first protocol to the second protocol includes converting the message into a digital format.

18. The computer readable medium of claim 15, wherein converting the message from the first protocol to the second protocol includes converting the message into an email format.

19. The computer readable medium of claim 15, wherein converting the message from the first protocol to the second protocol includes converting the message into an Instant Messaging format.

20. The computer readable medium of claim 15, wherein receiving a message in a first protocol includes receiving an analog voicemail message from a legacy voicemail server.

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