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(54) **FRAMEWORK TO NOTIFY AND INVITE USERS TO JOIN A COLLABORATIVE SESSION**

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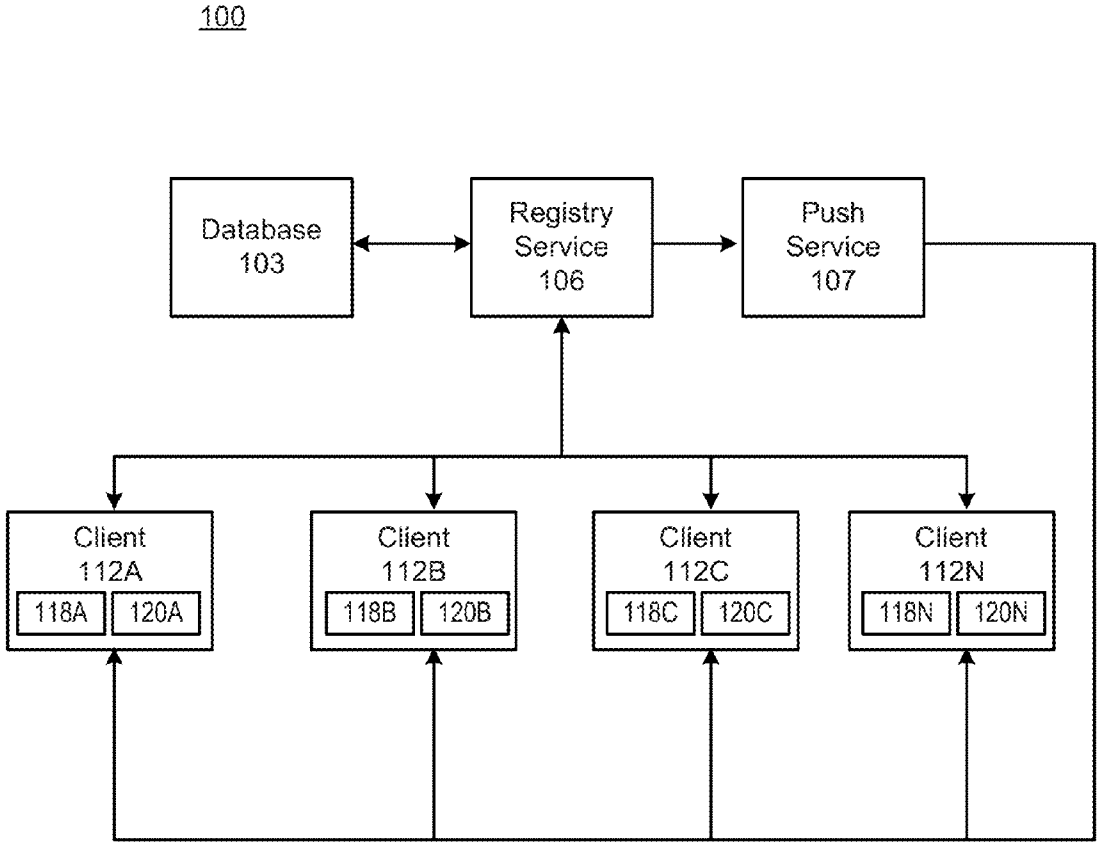
(57) **ABSTRACT**

A notification framework and method that quickly sends invitations one device to another device to join devices to collaboration session. Devices may be provided with an application that enables a user to register with a registry service. The registry service is provided as a mechanism to enable delivery of a collaboration invitation and joining of participants in the collaborative session. Notification invitations containing a collaboration URL may then be forwarded via a push service to the invited registrants. Each invited registrant is then provided an option to accept invitation and automatically join the session with the user. In another example, the host user may "pass" or "share" a session to an invited registrant rather than having an invited registrant join a session.



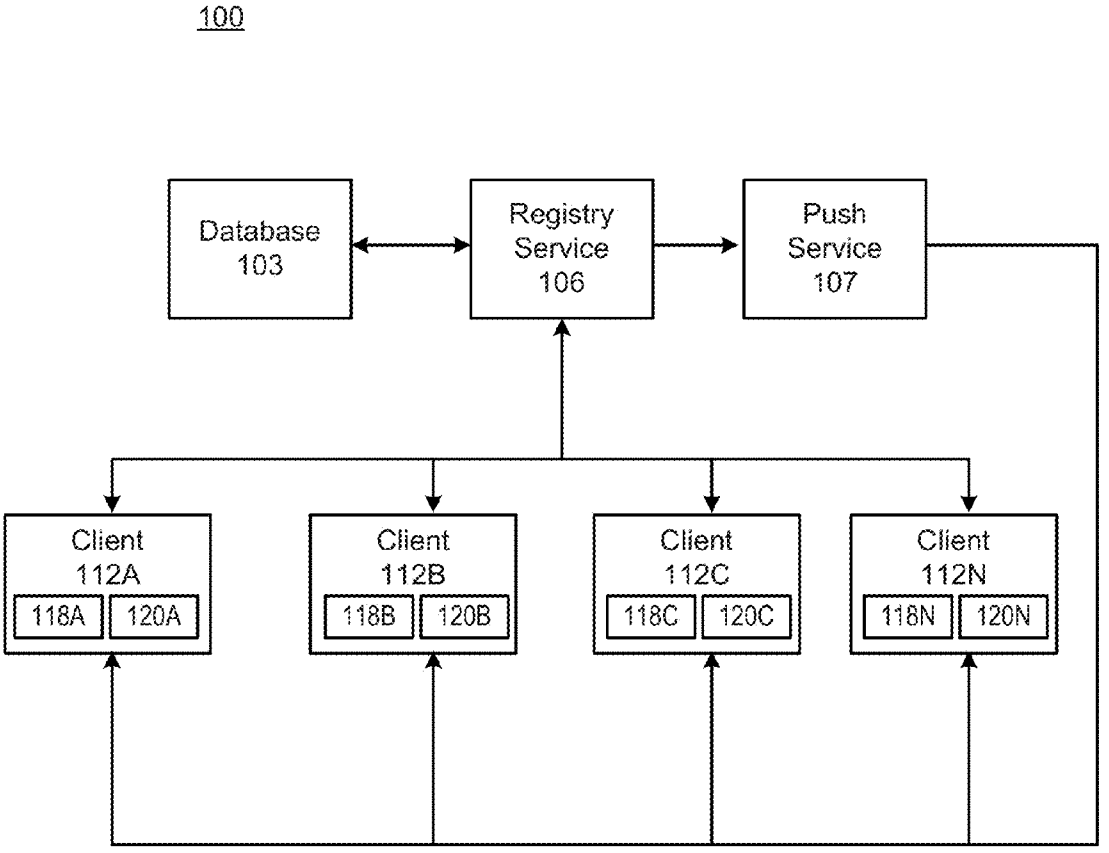

100
Database
103
Registry
Service
106
Push
Service
107
Client
112A
118A
120A
Client
112B
118B
120B
Client
112C
118C
120C
Client
112N
118N
120N

FIG. 1

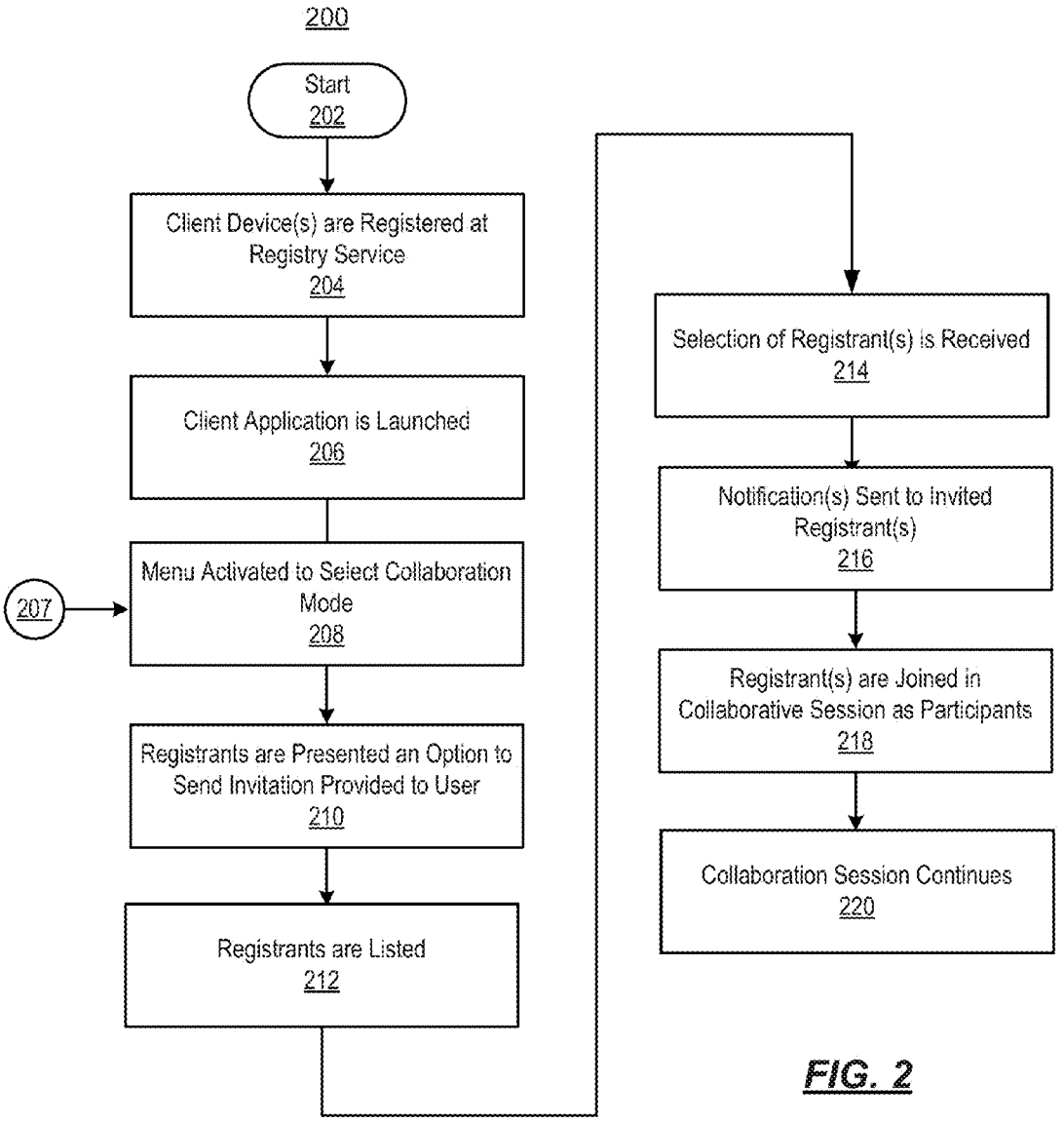

200
Start
202
Client Device(s) are Registered at Registry Service
204
Client Application is Launched
206
207
Menu Activated to Select Collaboration Mode
208
Registrants are Presented an Option to Send Invitation Provided to User
210
Registrants are Listed
212
Selection of Registrant(s) is Received
214
Notification(s) Sent to Invited Registrant(s)
216
Registrant(s) are Joined in Collaborative Session as Participants
218
Collaboration Session Continues
220

FIG. 2

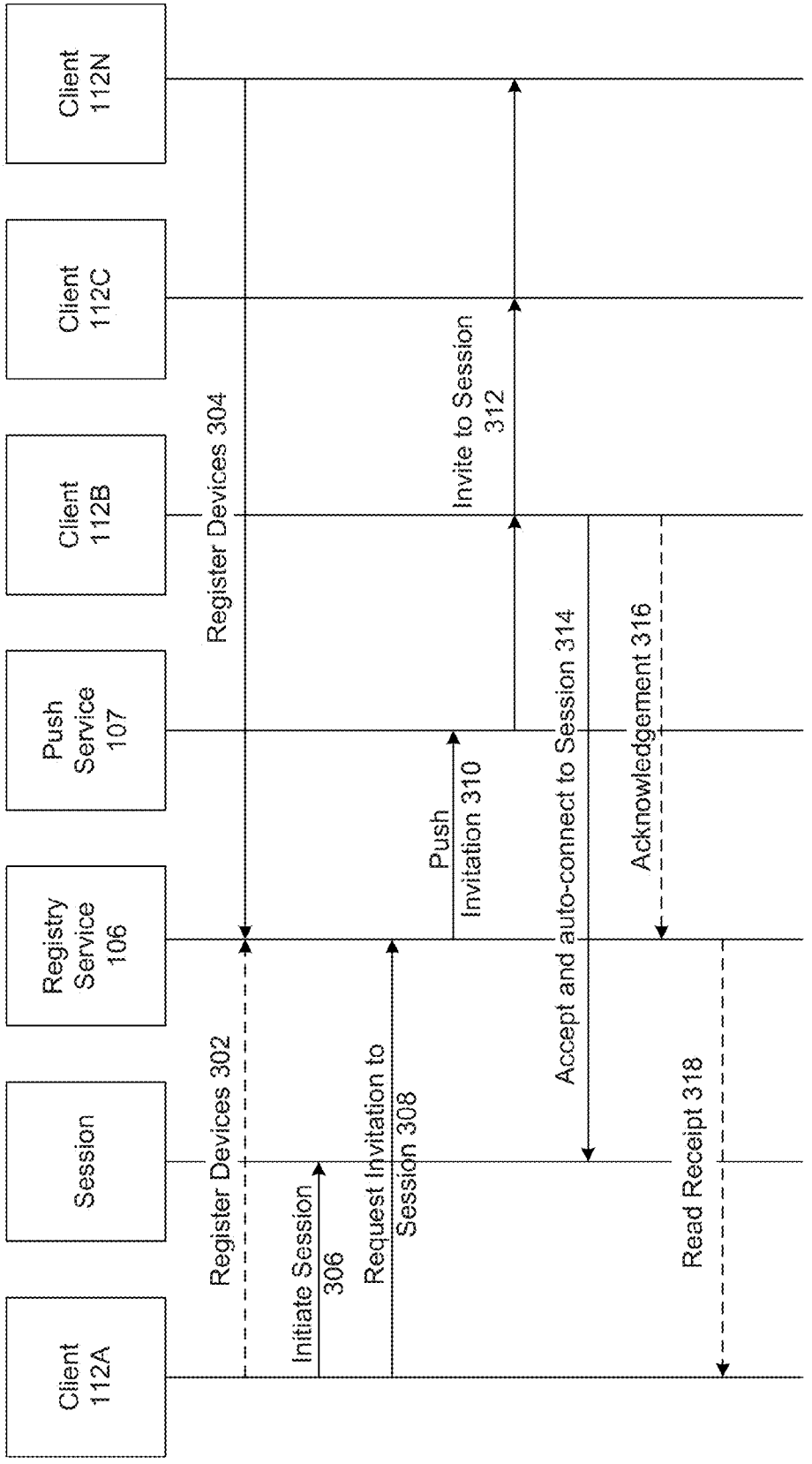

Client 112A
Session
Registry Service 106
Push Service 107
Client 112B
Client 112C
Client 112N
Register Devices 302
Initiate Session 306
Request Invitation to Session 308
Register Devices 304
Push Invitation 310
Invite to Session 312
Accept and auto-connect to Session 314
Acknowledgement 316
Read Receipt 318

FIG. 3

No SIM
10:33 AM
OnCall
Registration Information
Done
Full Name:
Joe
Email Address:
user1@calgaryscientific.com

FIG. 4

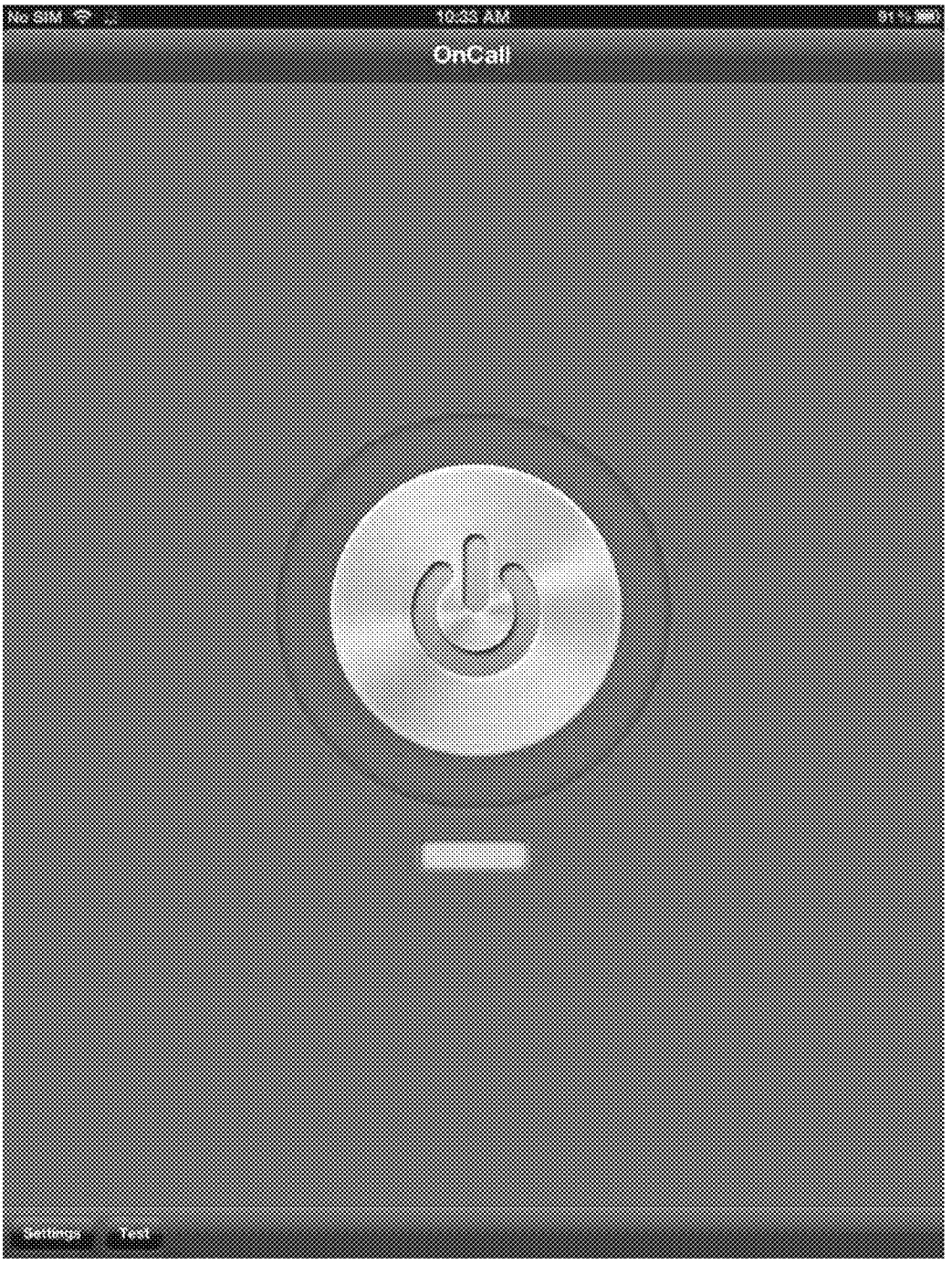


FIG. 5

No SIM
10:34 AM
OnCall
Success!
The test message was sent and received correctly by your device! You are now OnCall!

FIG. 6

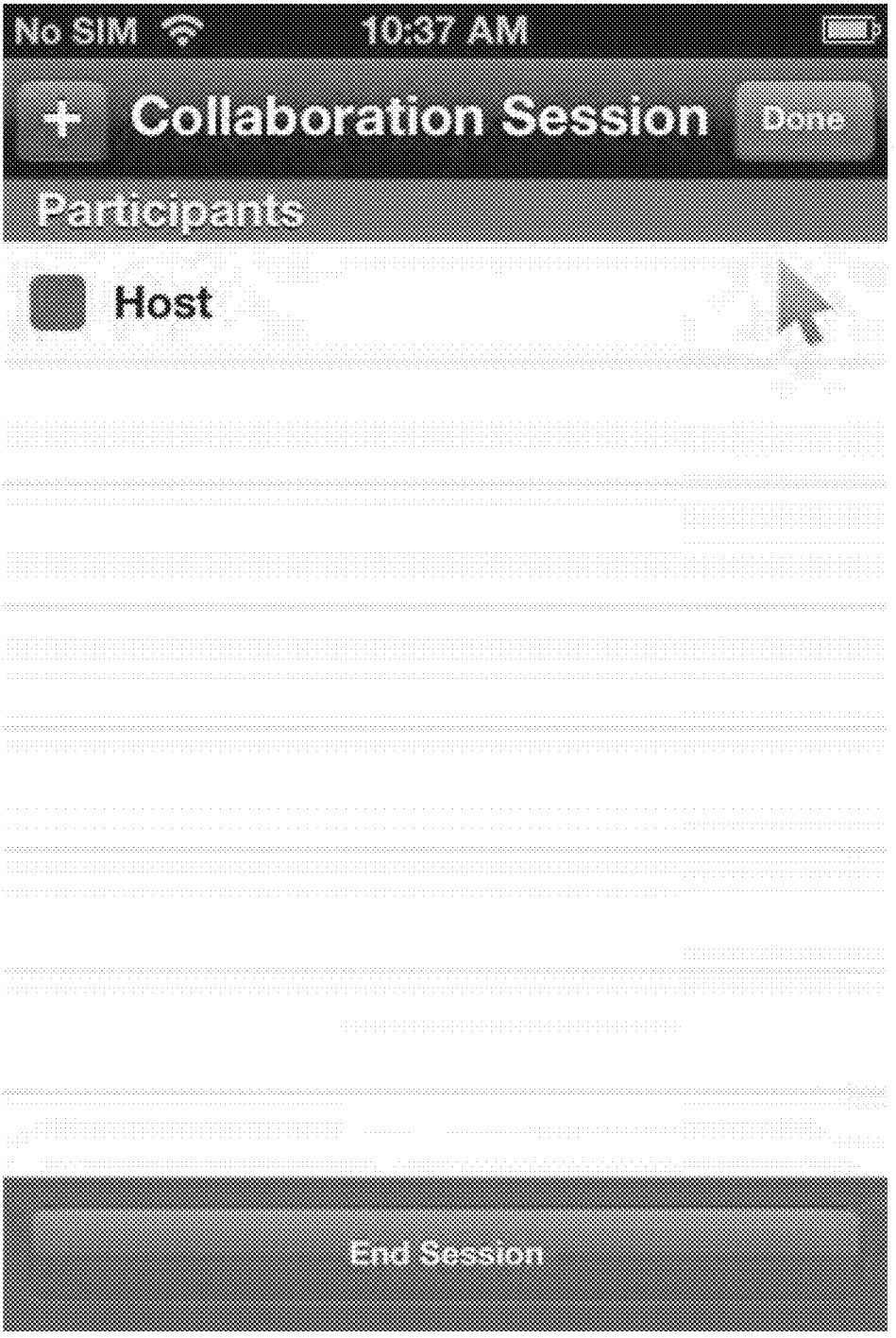

No SIM
10:37 AM
+
Collaboration Session
Done
Participants
Host
End Session

FIG. 7

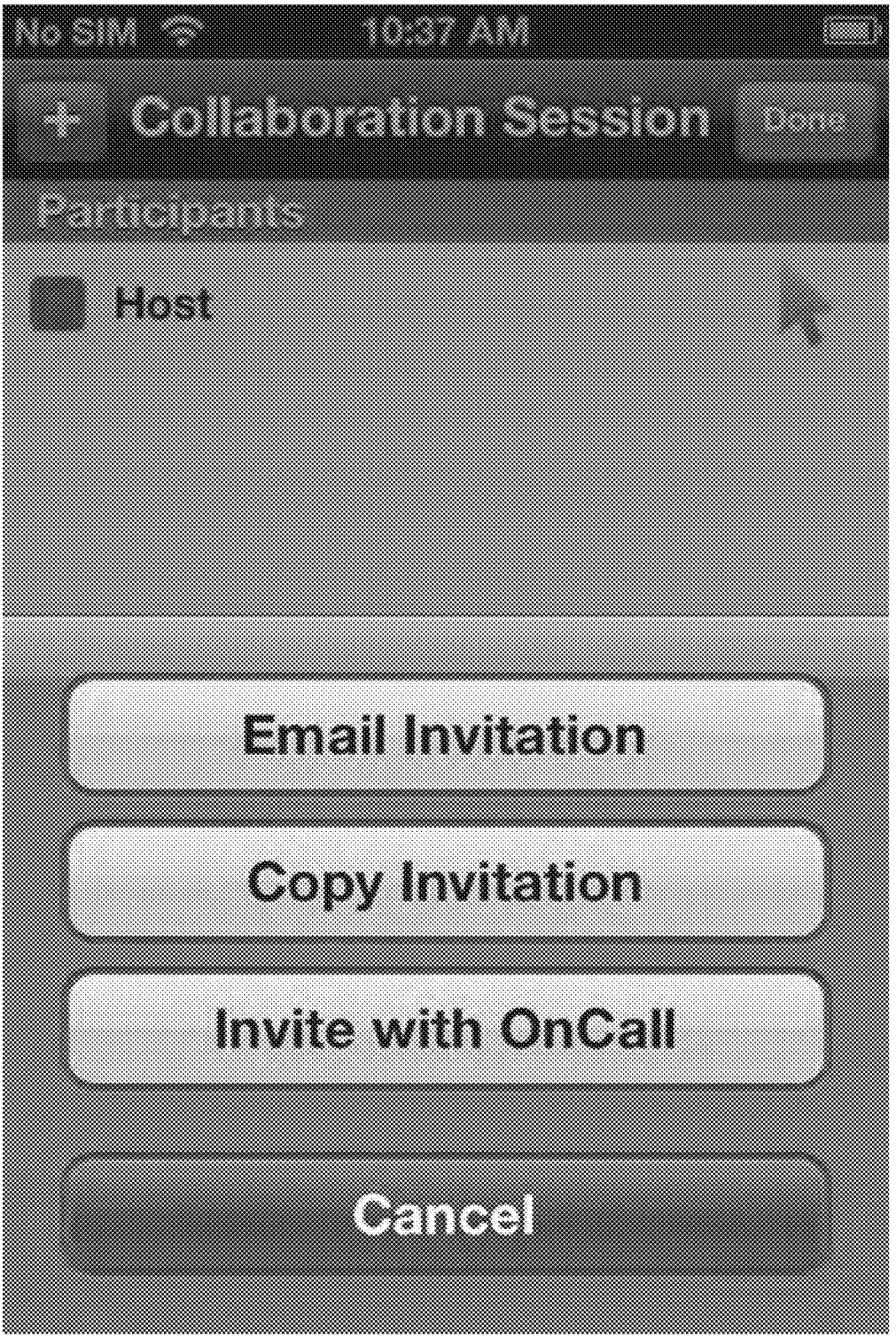

No SIM
10:37 AM
Collaboration Session
Done
Participants
Host
Email Invitation
Copy Invitation
Invite with OnCall
Cancel

FIG. 8

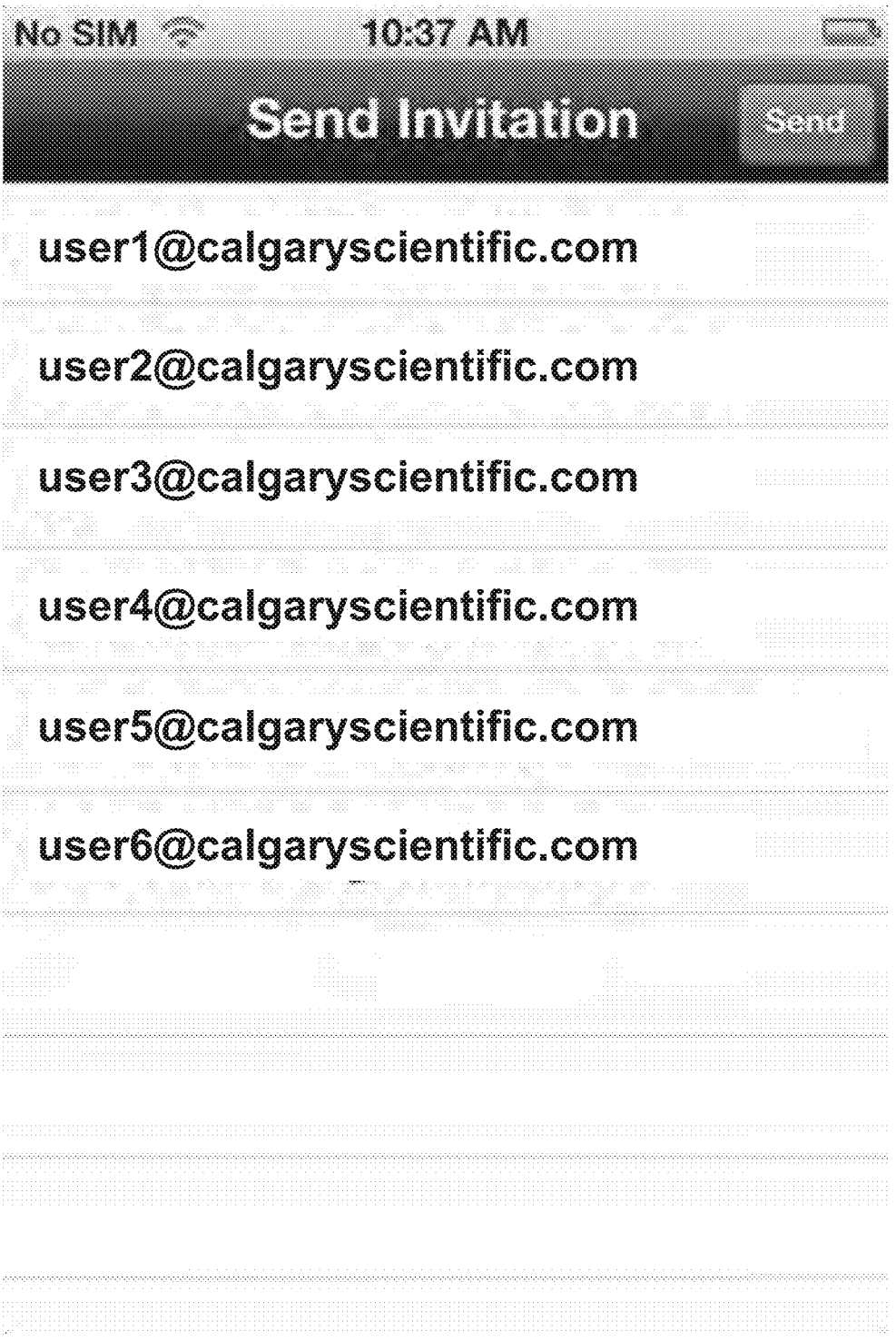

No SIM
10:37 AM
Send Invitation
Send
user1@calgaryscientific.com
user2@calgaryscientific.com
user3@calgaryscientific.com
user4@calgaryscientific.com
user5@calgaryscientific.com
user6@calgaryscientific.com

FIG. 9A

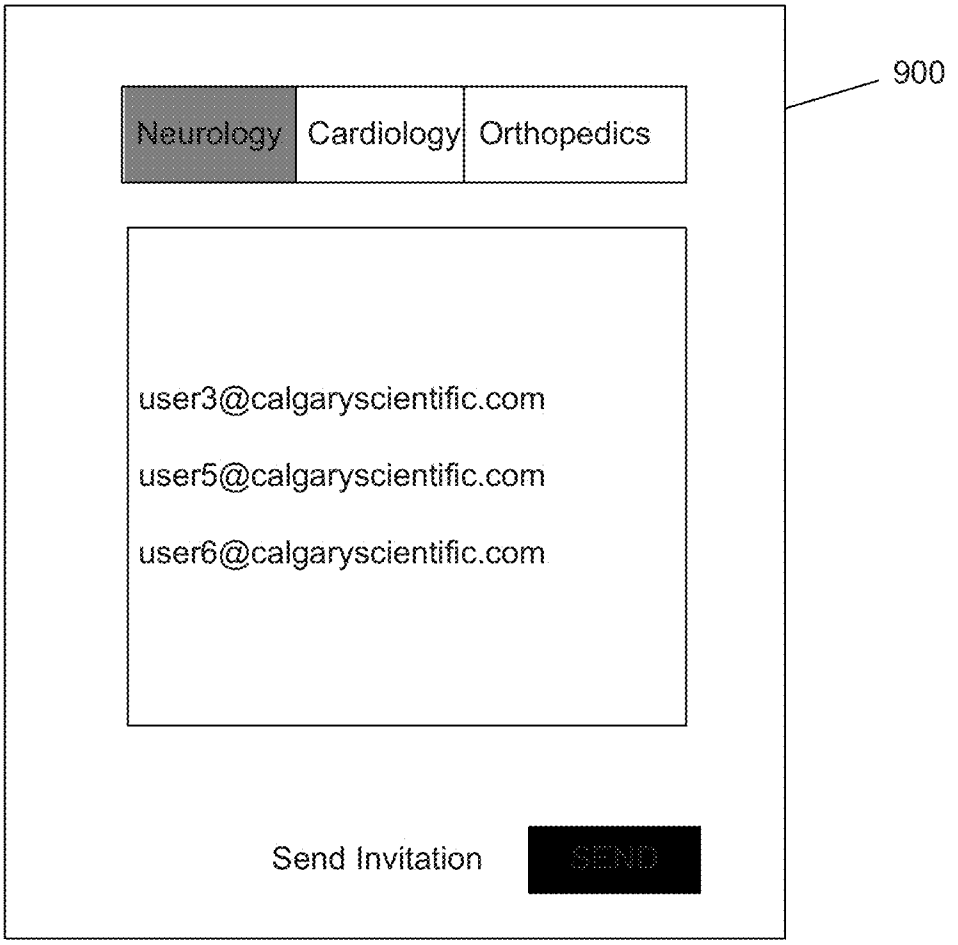

900
Neurology
Cardiology
Orthopedics
user3@calgaryscientific.com
user5@calgaryscientific.com
user6@calgaryscientific.com
Send Invitation
SEND

FIG. 9B

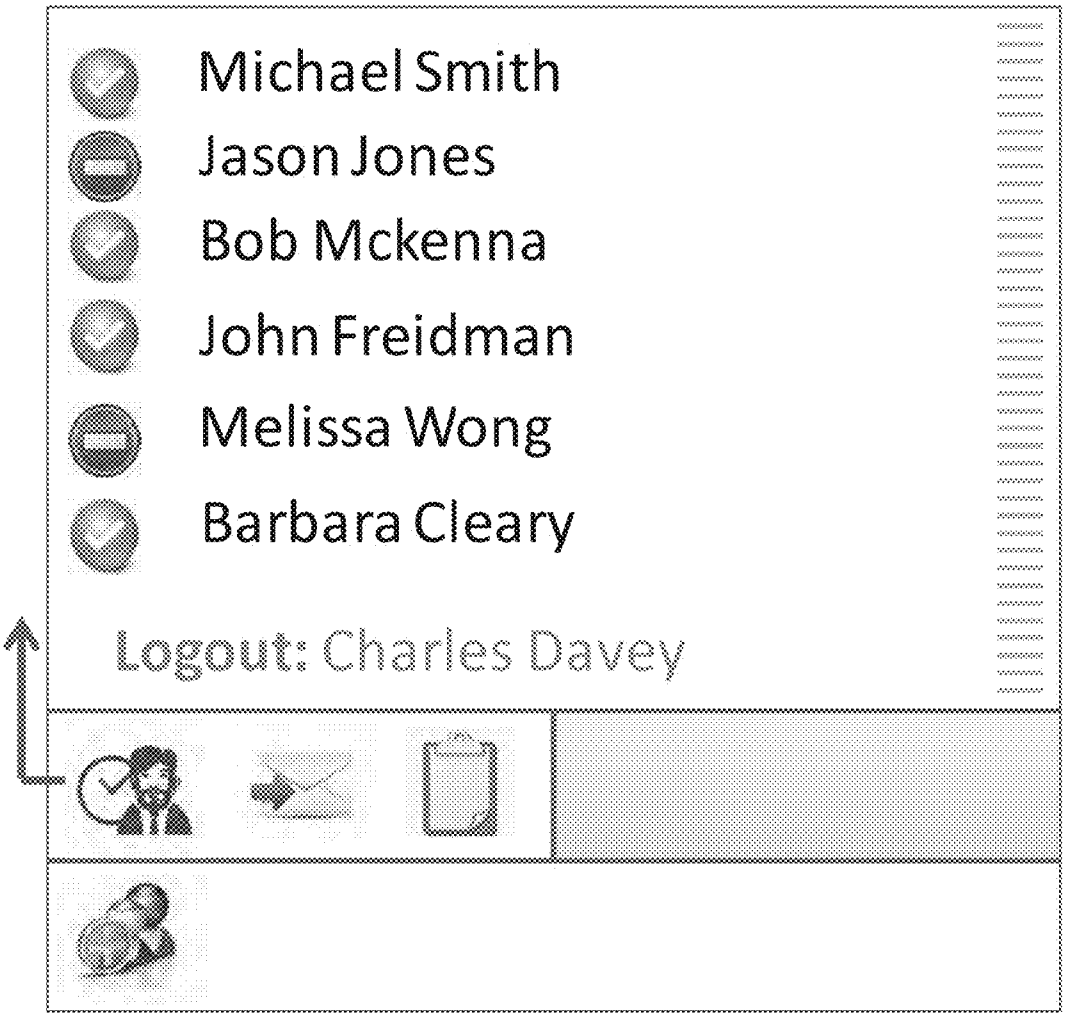

Michael Smith
Jason Jones
Bob Mckenna
John Freidman
Melissa Wong
Barbara Cleary
Logout: Charles Davey

FIG. 9C

No SIM
10:38 AM
Send Invitation
Send
user1@calgaryscientific.com
user3@calgaryscientific.com
user4@calgaryscientific.com
user5@calgaryscientific.com

FIG. 10

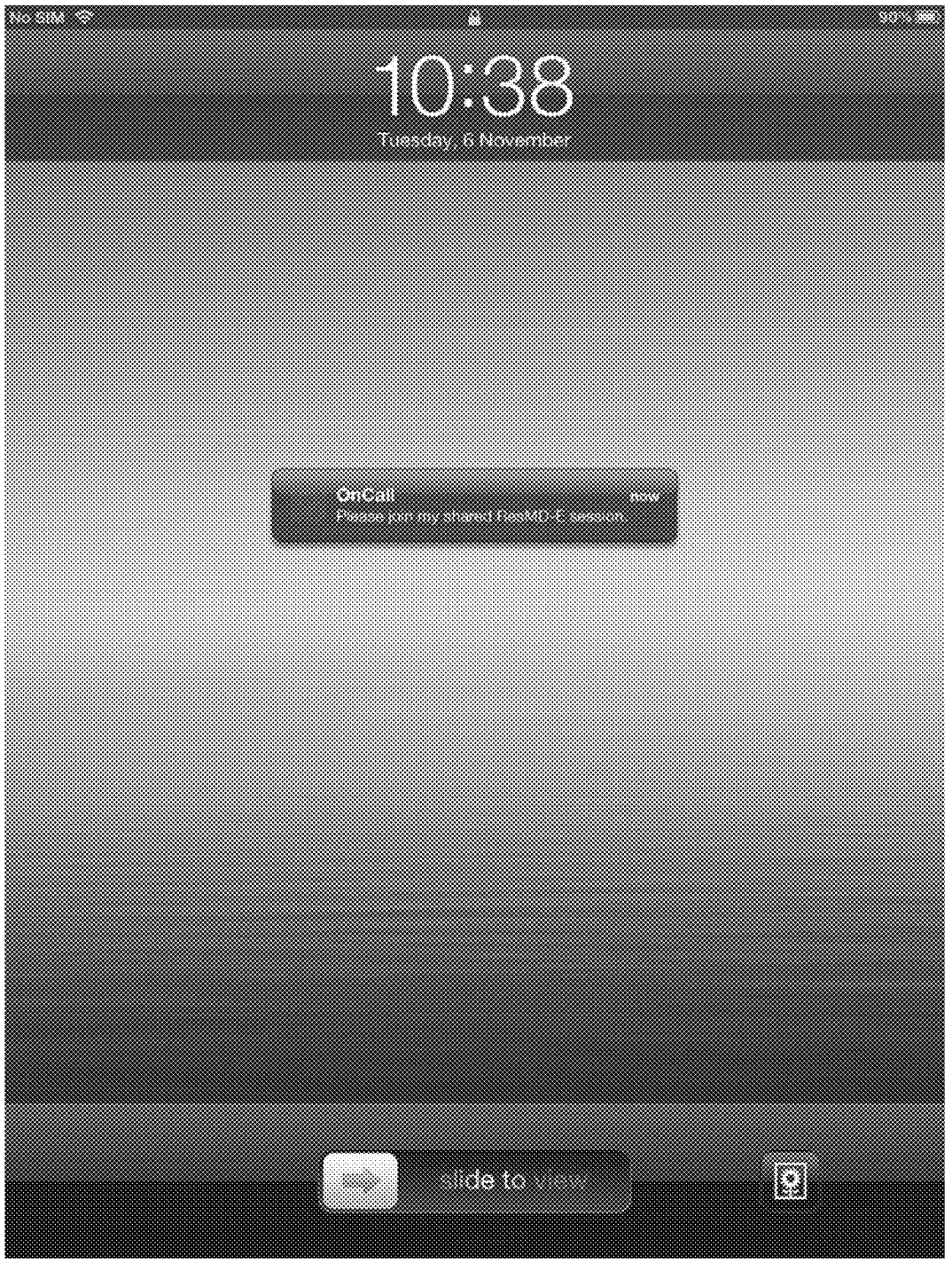


FIG. 11

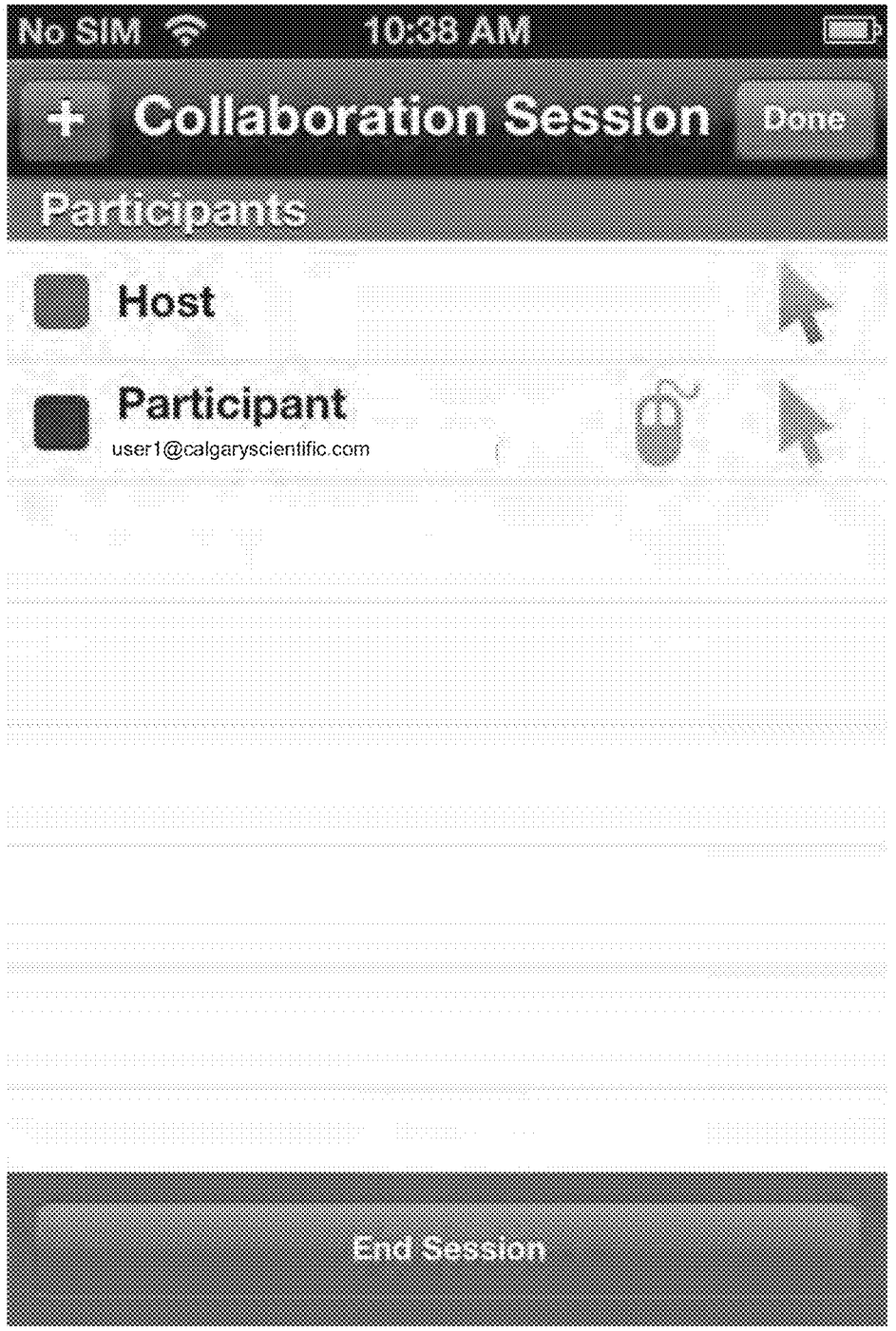

No SIM
10:38 AM
+
Collaboration Session
Done
Participants
Host
Participant
user1@calgaryscientific.com
End Session

FIG. 12

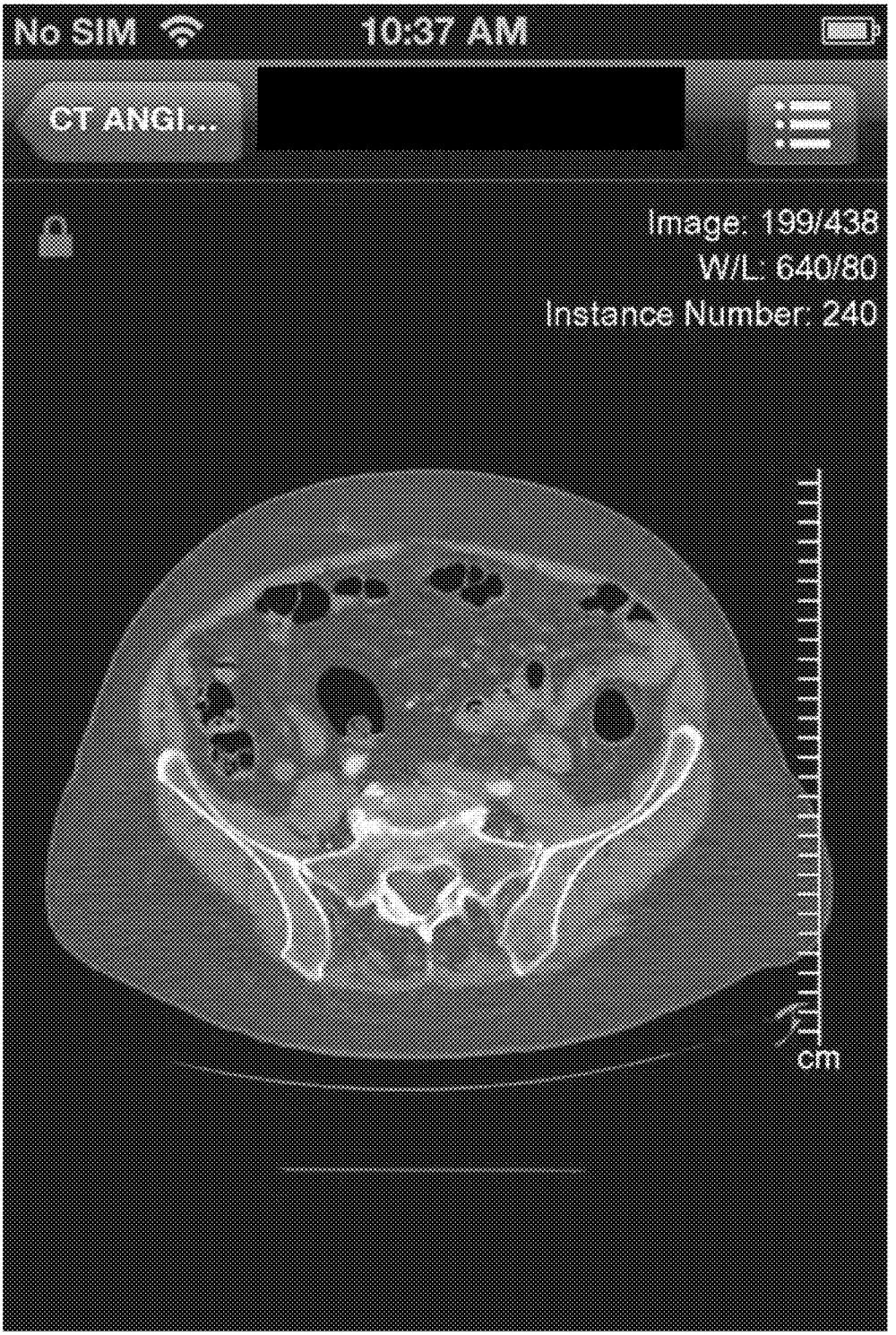

No SIM
10:37 AM
CT ANGI...
[redacted]
Image: 199/438
W/L: 640/80
Instance Number: 240
cm

FIG. 13A

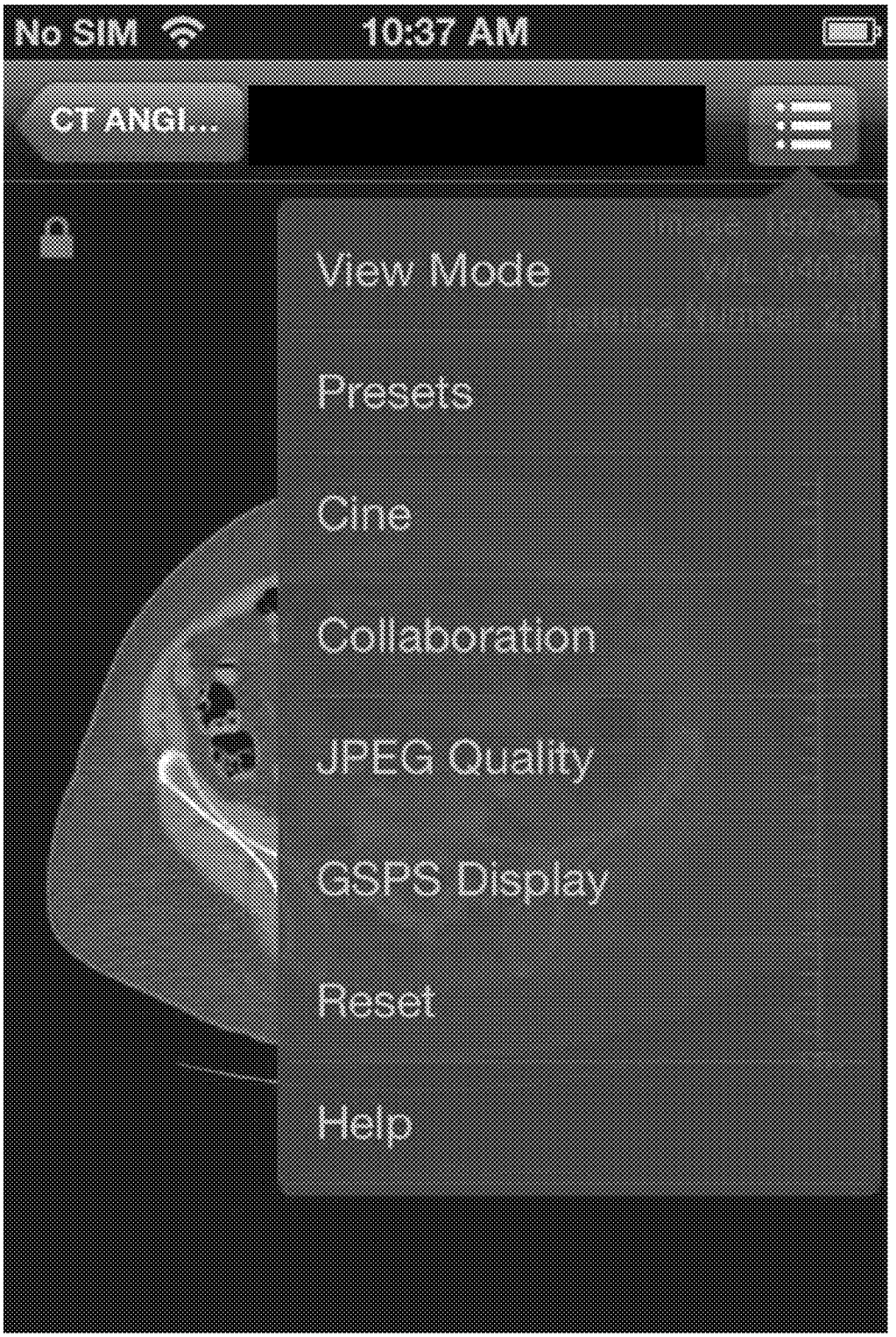

No SIM
10:37 AM
CT ANGI...
[redacted]
View Mode
Presets
Cine
Collaboration
JPEG Quality
GSPS Display
Reset
Help

FIG. 13B

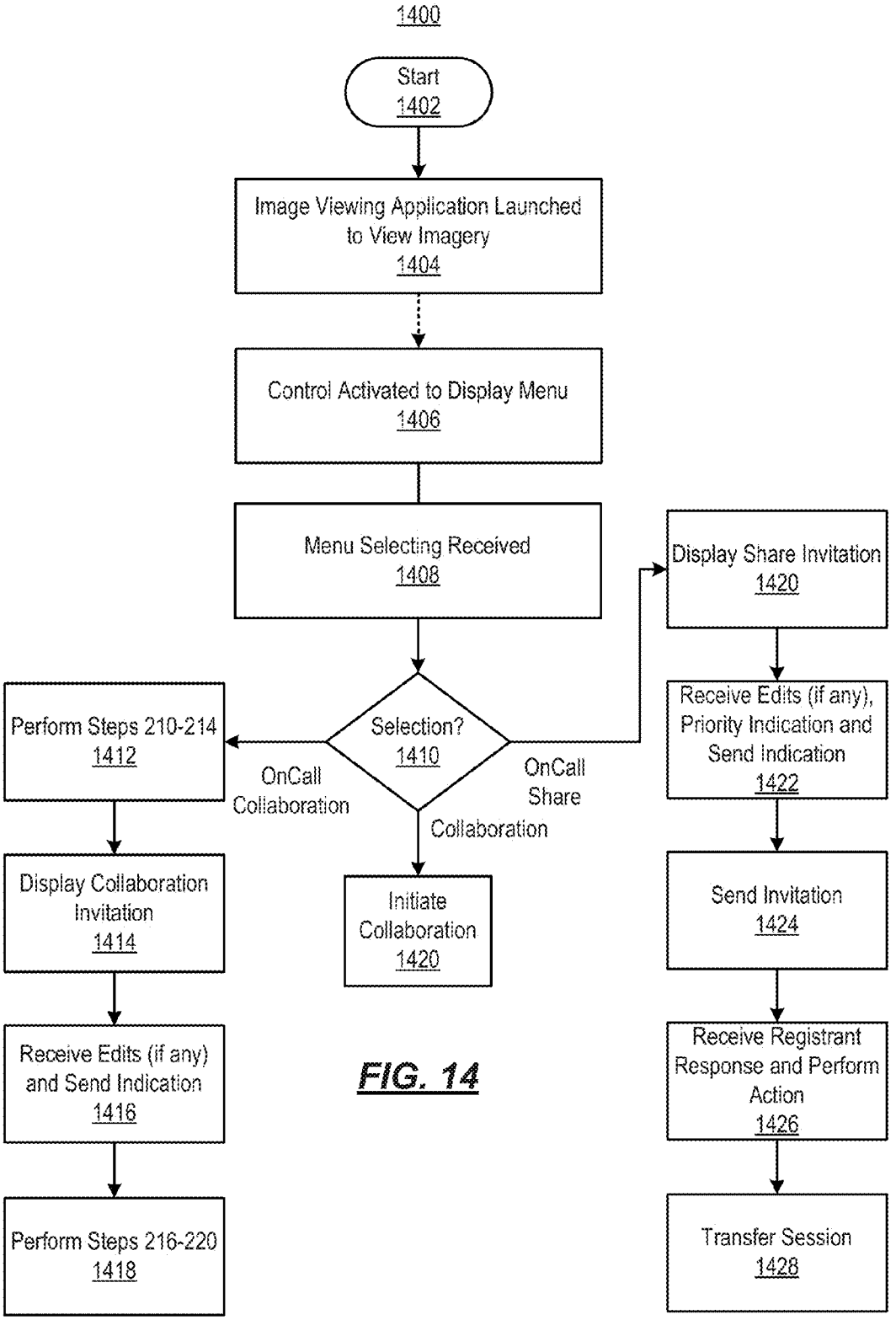

1400
Start
1402
Image Viewing Application Launched to View Imagery
1404
Control Activated to Display Menu
1406
Menu Selecting Received
1408
Selection?
1410
OnCall Collaboration
OnCall Share
Collaboration
Perform Steps 210-214
1412
Display Collaboration Invitation
1414
Receive Edits (if any) and Send Indication
1416
Perform Steps 216-220
1418
Initiate Collaboration
1420
Display Share Invitation
1420
Receive Edits (if any), Priority Indication and Send Indication
1422
Send Invitation
1424
Receive Registrant Response and Perform Action
1426
Transfer Session
1428

FIG. 14

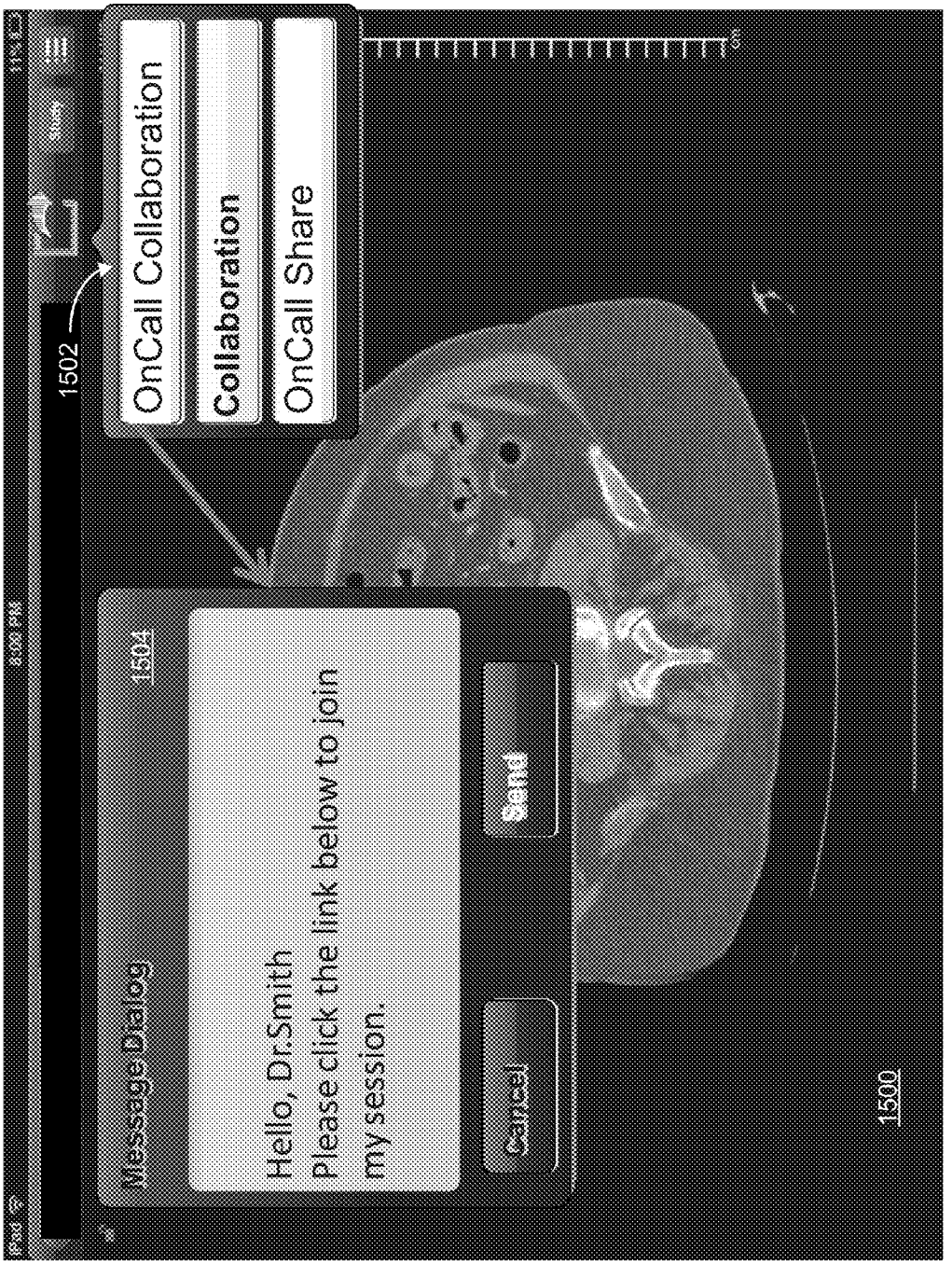

OnCall Collaboration
Collaboration
OnCall Share
1502
Message Dialog
1504
Hello, Dr.Smith
Please click the link below to join
my session.
Cancel
Send
1500

FIG. 15

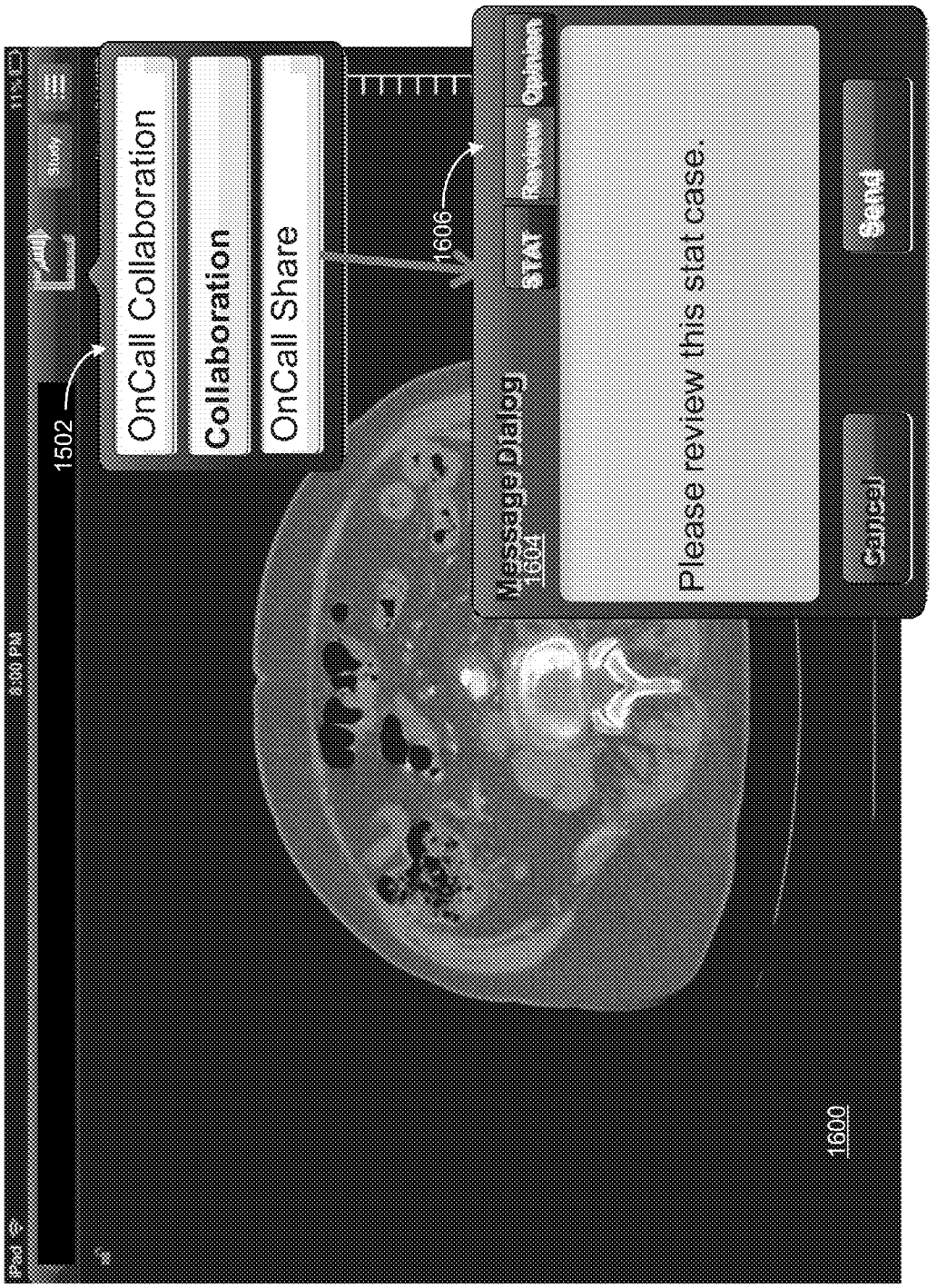

1502
OnCall Collaboration
Collaboration
OnCall Share
1606
Message Dialog
1604
STAT
Routine
Opinion
Please review this stat case.
Cancel
Send
1600

FIG. 16

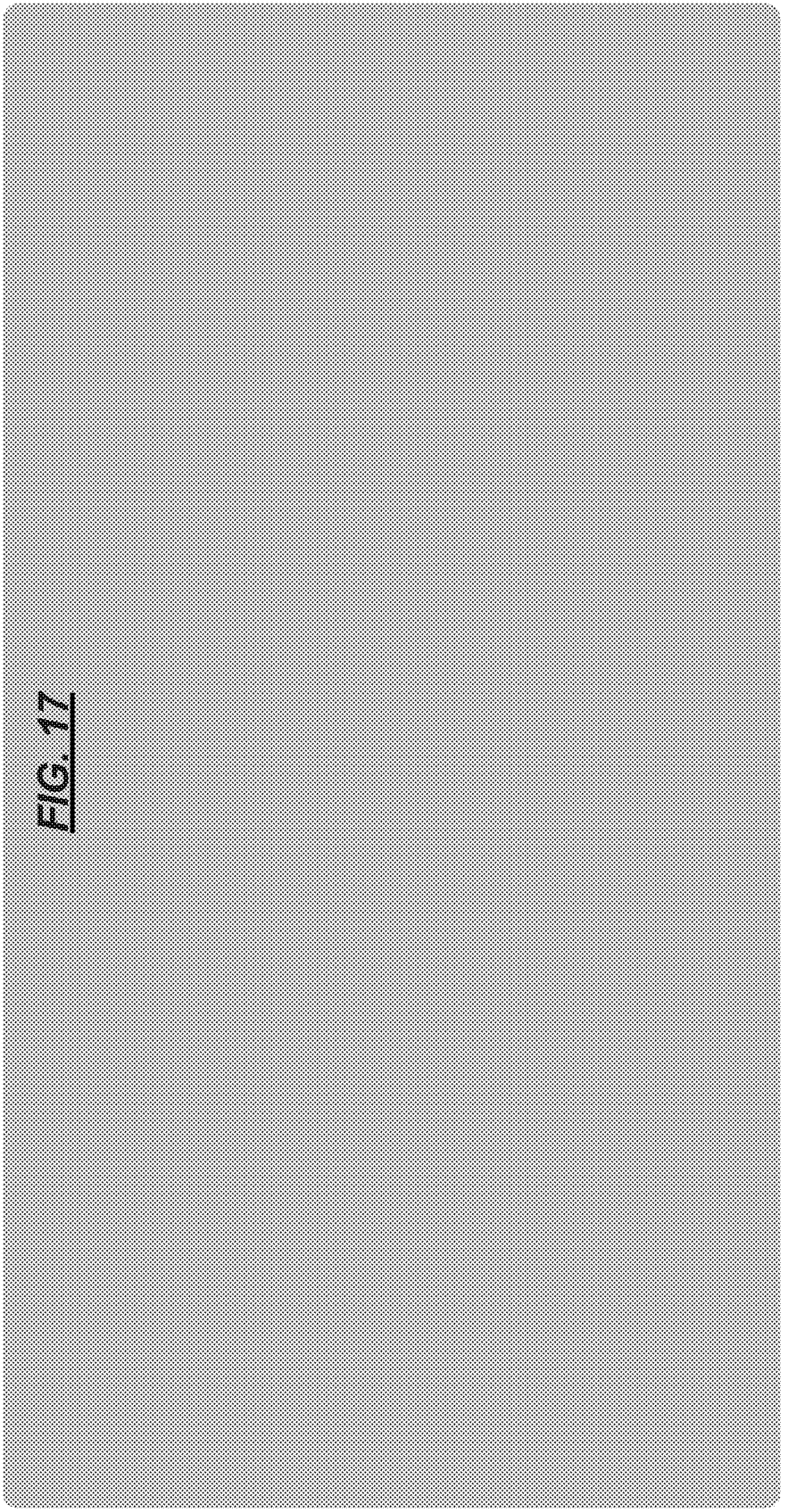


FIG. 17

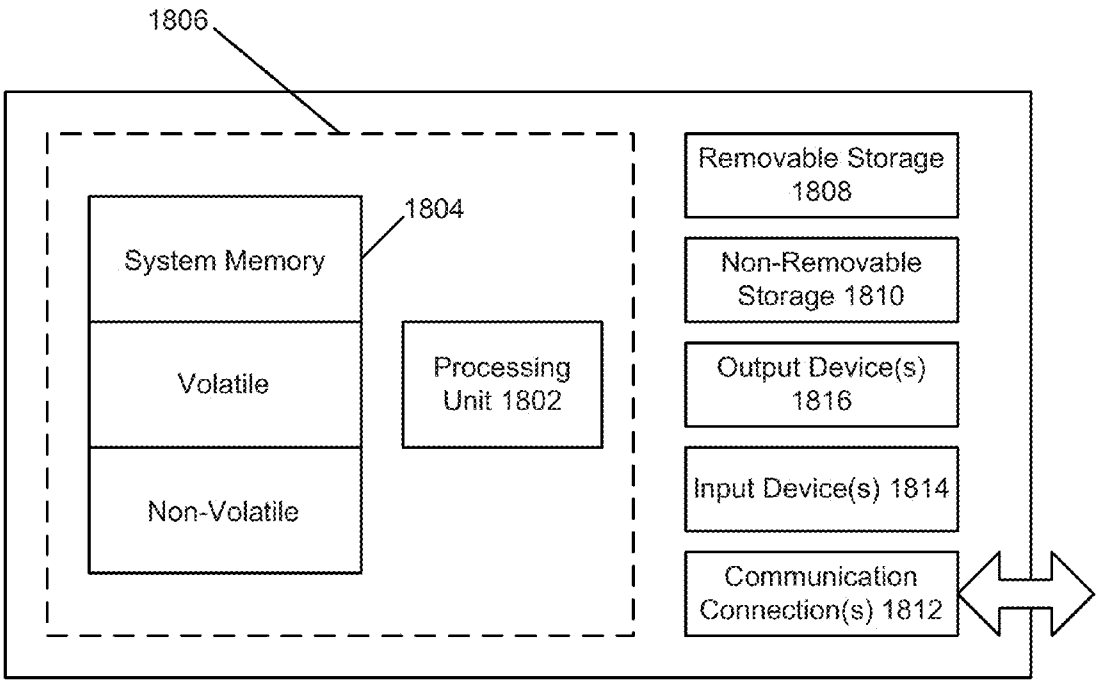

1806
1804
System Memory
Volatile
Non-Volatile
Processing Unit 1802
Removable Storage 1808
Non-Removable Storage 1810
Output Device(s) 1816
Input Device(s) 1814
Communication Connection(s) 1812
1800

FIG. 18

FRAMEWORK TO NOTIFY AND INVITE USERS TO JOIN A COLLABORATIVE SESSION

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Patent Application No. 61/725,381, filed Nov. 12, 2012, entitled "ARCHITECTURE HAVING INVITATION MECHANISM TO PROVIDE NOTIFICATIONS TO JOIN A COLLABORATIVE SESSION," which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] Certain environments may provide for collaboration among users of applications and data. For example, some Picture Archiving and Communication Systems (PACS) may provide remote access to the patient studies. In those systems the sending of invitations to join participants to a collaborative session to view data associated with an application is often accomplished by copying links and emailing them to other participants. This is cumbersome and may create security concerns if the links are misdirected to unintended recipients.

SUMMARY

[0003] Disclosed herein are systems and methods for providing invitations to devices to join a collaborative session using a notification framework. The notification framework includes a registry service that receives user registration information and an invitation request from a host to join at least one registered user to a session, and a database that stores the user registration information and the invitation request. The registry service communicates the invitation to a push service that provides for a push notification of the invitation request to a user device associated with the at least one registered user, and the framework is adapted to initiate collaborative sessions between the host and the at least one other registered user on-the-fly.

[0004] In accordance with another aspect, there is provided a method of initiating a session between a host and at least one registered user using a notification framework. The method may include receiving an indication from the host to begin a session; populating a user interface with at least one other registered user to join the session, the at least one other registered user being retrieved by a registration service from a database of registered users; inviting the at least one other registered user to join the session through a notification process that pushes an invitation request to a computing device associated with the at least one other registered user; and joining the at least one other registered user to the session in response to an acceptance of the invitation from the at least one other registered user.

[0005] In accordance with yet another aspect, there is provided a method of administering a workflow in a notification framework. The method includes registering users with a registration service of the notification framework, each of the users having a user account; associating at least one user device with each user account; applying rules in response to a notification request from a host to invite a second user to join a session; in response to the rules, forwarding the notification to the second user; and joining the second user to the session upon receipt of an acknowledgement of the notification from the second user.

[0006] In the above, the session may be a collaborative session or an application sharing session.

[0007] Other systems, methods, features and/or advantages will be or may 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/or advantages be included within this description and be protected by the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The components in the drawings are not necessarily to scale relative to each other. Like reference numerals designate corresponding parts throughout the several views.

[0009] FIG. **1** is a simplified block diagram illustrating a notification framework;

[0010] FIG. **2** illustrates an operational flow that may implemented in the framework of FIG. **1**;

[0011] FIG. **3** illustrates a call flow diagram showing communication flows within the framework of FIG. **1**;

[0012] FIGS. **4-7**, **8**, **9**A-**9**C, **10-12**, and **13**A-**13**B illustrate various user interfaces presented in accordance with the operational flow of FIG. **2** and call flow of FIG. **3**;

[0013] FIG. **14** illustrates another operational flow that may be implemented in the framework of FIG. **1**;

[0014] FIGS. **15-16** illustrate user interfaces associated with the operational flow of FIG. **14**;

[0015] FIG. **17** illustrates a pan-organizational network in which administrative services for users of the framework of FIG. **1** may be implemented; and

[0016] FIG. **18** illustrates an exemplary computing device.

DETAILED DESCRIPTION

[0017] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art. Methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present disclosure. While implementations will be described for remotely accessing applications, it will become evident to those skilled in the art that the implementations are not limited thereto, but are applicable for remotely accessing any type of data or service via a remote device.

[0018] Overview

[0019] In accordance with aspects of the present disclosure, client devices may be provided with an application that enables a user to register with a registry service within a notification framework. The registry service is provided as a mechanism to enable delivery of a collaboration invitation and joining of participants in the collaborative session. For example, a list of registrants may be displayed to a host user on, e.g., a mobile device display. The host user may select one or more registrants to join in the session from the list. Invitations may then be forwarded via a push service to the invited registrants. Each invited registrant is then provided an option to accept invitation and automatically join the session with the user. Thus, the present disclosure provides for a mechanism to enable users to quickly, easily and securely invite participants to collaborate in a session. In another example, the host user may "pass" or "share" a session to an invited registrant rather than having an invited registrant join a ses-

sion. Using a sharing operation, the session is passed to the invited registrant, the host user is no longer part of the session and the invited registrant takes over as host.

Example Framework

[0020] With the above overview as an introduction, reference is now made to FIG. **1** where there is illustrated a notification framework **100** that, e.g., quickly sends URLs from one device to another device, such as from one mobile device to another. There are many possible non-limited uses of such a framework, such as sharing web links to another person, or setting up a collaboration session between people. The framework **100** enables one device to send an invitation that contains URL(s) to another device. In addition, the framework **100** may share other types of information other than URLs, such as messages, documents, pictures, multimedia data, etc. The information may include information that is maintained in a database for each user of the framework, such as a Skype ID, Google Voice (or other communication ID). In some implementations, the invitations may be encrypted by the devices, providing zero knowledge on the server.

[0021] Within the framework **100**, there may be include a database **103**, a registry service **106** and a push service **107**. Generally, the framework **100** provides registration, notification and invitation services in order to initiate collaborative sessions between users on-the-fly, e.g. a user is automatically and dynamically joined upon acceptance of the invitation. The framework **100** does not require a statically predefined relationship between the users. An example of the services provided by the framework **100** is OnCall, available from Calgary Scientific, Inc., Calgary, Alberta, Canada. The registry service **106** is provided to enable users to register as an available participant to collaboration or application sharing sessions within the framework **100** and to expose the users' availability to others. The database service **103** is provided to store user information, invitation, and other documents associate with the framework **100**. The user information may include, but is not limited to, the user's email address, full name, a user computing device identifier, contact information, etc. The push service **107** provides for push notifications of invitations from the registry service **106** to available users to join collaborative sessions. The push service **107** may be used by the registry service **106** to propagate information to client computing devices **112**A, **112**B, **112**C, **112**N communicatively connected to the framework **100**.

[0022] The client computing devices **112**A or **112**B may be wireless handheld devices such as, for example, a smartphone such as an IOS-based IPHONE **112**A or an ANDROID-based device **112**B connected via a computer network such as, for example, the Internet, to the registry service **106** and the push service **107**. Similarly, the client computing devices may also include a desktop/notebook personal computer **112**C or a tablet device **112**N that are connected by the communication network to the registry service **106** and the push service **107**. It is noted that the connections to the communication network may be any type of connection, for example, Wi-Fi (IEEE 802.11x), WiMax (IEEE 802.16), Ethernet, 3G, 4G, etc. Further, the database **103**, registry service **106** and push service **107** may be executed on a general purpose computing device, such as that shown in FIG. **18**. The database **103**, registry service **106** and push service **107** may be executed on a same or different computing device.

[0023] The client computing devices **112**A, **112**B, **112**C, **112**N may execute a client application **120**A, **120**B, **120**C, **120**N, such as a web browser, to enable a user to display data, for example, in a graphical display with touch-screen. The client application **120**A, **120**B, **120**C, **120**N may also provide for collaboration of an application among the client computing devices **112**A, **112**B, **112**C, **112**N.

[0024] In accordance with aspects of the present disclosure, a notification application **118**A, **118**B, **118**C, **118**N cooperates with the registry service **106**, which acts a server to the notification application **118**A, **118**B, **118**C, **118**N. The notification application **118**A, **118**B, **118**C, **118**N may enable a user to register with the registry service **106** to indicate the user's availability to participate in a collaborative session. The notification application **118**A, **118**B, **118**C, **118**N may also listen for notifications of invitations to join collaborative sessions.

[0025] On desktop client computing devices, a user may send invitations to other users through a web browser running an HTML5 application (a web client). A JavaScript library may be downloaded from the registry service **106** and used to communicate to the framework components (e.g., the registry service **106**). The JavaScript library can be included in any web application. Push notifications may be provided to web applications by the push service **107**, described below. An example of the push service **107** for web clients is pusher.com, which hosted API for that may be used to provide notifications to connected clients.

[0026] On mobile devices such as Android and iOS devices, a user may register to be available by opening a native "OnCall" client application (i.e., the notification application **118**A, **118**B, **118**C, **118**N) and registering with the registry service **106**. The client applications may send device registrations to the registry service **106** so that they can receive platform specific push notifications. In the case of Android devices, Google Cloud Messaging may be used. In the case of Apple devices, the Apple Push Notification service may be used. In some implementations, the notification application may perform encryption of important parts of message, so that the data is protected when stored in the database **103**.

[0027] Users of the client computing devices **112**A, **112**B, **112**C, **112**N may register with the registry service **106** using an application programming interface (API) exposed by the registry service **106**. The API allows a user to register their device type and device identification with the registry service **106**. For example, a user may register one or more of client computing devices **112**A, **112**B, **112**C, **112**N. Also, users are able to unregister if they no longer want to be contacted by the registry service **106**. As will be described below, a user may initiate the collaboration session by requesting a list of currently registered users. The list may be queried for particular users. From that list, registrants may be selectively sent invitations to join a collaborative session with the requesting user. Upon acceptance, registrants are automatically joined to the collaborative session, as described below.

[0028] An invitation from the registry service **106** may contain a title, description, and a universal resource locator (URL) to launch join the collaboration session when the would-be participant acknowledges the invitation. In accordance with the present disclosure, the invitation may also contain a sender ID, a message, a priority level or state (e.g., high, medium, low; in medical field this could more particularly be, e.g., stat, ASAP, critical, normal, review, second opinion, etc.), or an "accept"/"ignore selection" (this may be used in healthcare to "close the loop" to provide a confirmation that the case has been opened as opposed to just read by

the recipient). The accept option provides an acknowledgement that the information associated with the invitation has been actually handed-off to the invited registrant.

[0029] The registry service **106** may store user registrations in memory or in the database **103**. Invitations sent by the registry service **106** may be communicated using a server side protocol in accordance with the type of device to which invitation is being communicated. The invitations forwarded by the registry service **106** may include a title, description, and a URL.

[0030] The database **103** may store user, invitation, and receipt documents. The database **103** may also maintain availability information for each user based on calendaring information. Additionally or optionally, presence information stored in the database **103**, which may be used to determine if notifications are forwarded to the user's device. Yet further, priority information (e.g., a precedence order of users to which notifications are sent) may be stored in the database **103** on a per user, per group, or global basis. The priority information may be used to send messages sequentially, with a delay between each subsequent recipient to allow for an acceptance.

Invitations may be stored such that each Invitation has a unique ID which is sent to the clients in push notifications. Clients are responsible for retrieving and decrypting the stored invitations. The clients can also delete invitations that are not longer needed. Receipts are used to track delivery of an invitation by sending the original sender special invitations that indicate delivery, acceptance, and rejection of the invitations by a specific user. All messages sent to the client are invitation notifications. The client examines the URL to know whether the invitation is a receipt.

[0031] Registration information may be stored within the database **103** in a secure fashion. As noted above, registration information may include a user's email address, full name, a client device identifier, Skype ID, Google Voice number, etc. Querying of the users may be performed using the above information or some combination thereof. The registry service **106** may also provide for 'categories' or restriction of users based on organization to allow the list of users to better scale with usage. For example, if a million users are registered with the registry service **106**, the list would take a long time to download to the client computing device **112**A, **112**B, **112**C, **112**N. Adding a mechanism for partitioning the list on company, group, specialty, tags, will likely make searching and restricting the list of registered users much easier to navigate (see, FIGS. **9**B-**9**C for examples).

[0032] The push service **107** provides for push notifications of invitations from the registry service **106** to registered user devices to join collaborative sessions. The push service **107** may be used by the registry service **106** to propagate information to the client computing devices **112**A, **112**B, **112**C, **112**N. Each client computing devices **112**A, **112**B, **112**C, **112**N may establish a connection with the push service **107** and receive notifications over this connection at the notification application **118**A, **118**B, **118**C, **118**N running thereon. As noted above, the invitation may include certain information.

[0033] Where the push service **107** is performing Apple Push Notifications, the Apple Push Notifications (ANP) encode messages may be delivered to the notification application **118**A, **118**B, **118**C, **118**N through a system of public key signed messages. The notification application **118**A, **118**B, **118**C, **118**N would receive the notifications of invitations and launch the client application **120**A, **120**B, **120**C, **120**N through a built-in URL launching mechanism.

[0034] On Android client computing devices the notification application **118**A, **118**B, **118**C, **118**N may be developed as a stand-alone application to compartmentalize the functionality. The Android operating system includes a system of Intents that allow separate applications to 'link in' to various operations the user needs to do, such as 'Viewing' and 'Sharing'. For example, in implementations in accordance with the present disclosure, the notification application **118**A, **118**B, **118**C, **118**N may be split into four parts:

[0035] 1. A main application where an icon is presented to allow a user to register to be on call.

[0036] 2. The G2DM receiver component that receives incoming push notifications.

[0037] 3. A test message activity which sets up a VIEW action receiver for oncall:// type URLs.

[0038] 4. A SendActivity which handles the Android SEND action for text/plain and text/url mime types and sends Invite messages to the server.

[0039] In accordance with the above, the notification application **118**A, **118**B, **118**C, **118**N and the client application **120**A, **120**B, **120**C, **120**N may be implemented on other client computing device platforms using a native push notification mechanism of the client computing device platform.

[0040] Thus, the framework **100** provides for a mechanism to enable users to quickly, easily and securely invite participants to collaborate in a session.

Example Operational Flow(S)

[0041] FIG. **2** illustrates an operation flow **200** the may be implemented in the framework **100**. FIG. **3** illustrates an example call flow that illustrates communication flows between the entities in FIG. **1**. FIGS. **4-8**, **9**A-**9**C, **10-12**, and **13**A-**13**B illustrate example user interfaces associated with the operational flow **200** and call flow **300**.

[0042] At **202**, the process begins, where at **204** client devices are registered at the registry service **106** as being available to join, e.g., collaborative sessions. As shown in FIG. **4**, a user may launch the notification application (e.g., OnCall) **118**A, **118**B, **118**C, **118**N that requests user information, such as a full name and email address. This information is saved to the client computing device **112**A, **112**B, **112**C, **112**N. Thereafter, the notification application **118**A, **118**B, **118**C, **118**N then presents an icon to enable the user to register with the registry service **106** (flows **302** and **304**). For example, as shown in FIG. **5**, the user may press the button icon to register with the registry service **106**. To confirm that registration was successful at **204**, a confirmation message may be provided to the notification application **118**A, **118**B, **118**C, **118**N and presented to the user (FIG. **6**).

[0043] At **206**, the client application **120**A, **120**B, **120**C, **120**N is launched by a first user at one of the client computing devices associated with the first user. For example, a web browser may be launched as the client application **120**A, **120**B, **120**C, **120**N by the first user of the client computing device **112**A, **112**B, **112**C, **112**N. If the first user wishes to establish a collaborative session, then at **208**, the user may activate a Collaboration mode using a menu (flow **306**). In this work flow, the user is the "host" of the collaboration session.

[0044] In accordance with an aspect of the operational flow **200**, the operations at **202-206** may be omitted and the host may begin at entry point **207**. In such a scenario, the host will be an unregistered user of the notification framework **100**.

Here, the host may send invitations, as described below; however the host will not receive an acknowledgement of a successful acceptance of the host's invitation through the framework **100**, nor will the host be able to query the database **103** for user information and status.

[0045] At **210**, selecting the Collaboration mode then presents to the host a list of users in the collaborative session, as shown in FIG. **7**. Initially, because the host is the only participant in the collaboration session, the host is the only participant shown. The host may decide to send and invitation using the framework **100** of FIG. **1** by selecting "Invite with OnCall" (FIG. **8**A) or clicking an "OnCall" icon in a collaboration graphical user interface **800**).

[0046] At **212**, registrants are listed at the host's client computing device in response to the user selection of "Invite with OnCall" received in the user interface of FIGS. **9**A-**9**C The registrants may be users who are available, authorized and/or qualified to attend and a collaborative session to, e.g., view medical images. The list may be presented as a simple list of users, as illustrated in FIG. **9**A. As shown in FIG. **9**B, the list maybe provided as groups of similarly situated users (e.g., Neurology, Cardiology, Orthopedics) and organized under a group identifier **900**. As shown in FIG. **9**C, additional information may be presented to a registered host regarding the status of each user, for example, whether the user is currently available or able to receive notifications.

[0047] Thus, in the above, the host may or may not be registered with the registry service **106** to activate the Collaboration mode. If the host is unregistered, the registry service **106** may be accessed using, e.g., a web browser or other client application to query the list of registrants. If the host is registered, the host may query the registry service **106** for registrants using the notification application **118**A, **118**B, **118**C, **118**N. The registry service **106** may then forward additional information with notifications to the registrants, such as but not limited to an identification of the host user in an invitation accompanying the notifications.

[0048] At **214**, a user selection (e.g., from the host) of the registrants to be invited is received within the user interface displayed at the host's client computing device. As illustrated in FIG. **10**, more than one registrant can be selected at **214**. Alternatively or additionally a message may be forwarded with the invitation. The selections may be forwarded to the registry service **106** (flow **308**) to enable notifications comprising an invitation and associated information (e.g., the message) to be sent to the selected registrants at **216** (flow **310**). For example, as shown in FIG. **11**, a notification message may be presented on the selected registrant's computing device. The notification may be received by the notification client application **118**A, **118**B, **118**C, **118**N on the registrant's computing device (flow **312**).

[0049] In accordance with some implementations, invitations may be forwarded to an entire group by selecting the group identifier **900**. As such, the computing devices associated with all Neurologists may receive a notification when selecting the Neurology group. Still further, notifications may be sent to predetermined or all devices associated with a user, as described below with reference to FIG. **18**. For example, if a user is associated with a tablet, a mobile phone and a desktop, all three devices or a combination of the devices may receive the invitation forwarded in flow **312**.

[0050] At **218**, the registrants are joined in the collaborative session. If a participant accepts the notification/invitation (flow **314**), then the registrant is joined automatically as a participant and, e.g., the client application **120**A, **120**B, **120**C, **120**N is launched on the participant's computing device via a URL in the invitation. Optionally, an acknowledgement may be sent from the invited registrant to the registry server **106** (flow **316**) and/or a read receipt sent to the registered host (flow **318**) if a message was forwarded with the invitation. The host is able to see all of the joined participants in a user interface, such as FIG. **12**. If configured, all participants may be able to see the list of participants shown in FIG. **12**. At **220**, the collaborative session continues, as all users may be able to interact with the client application **120**A, **120**B, **120**C, **120**N.

[0051] In a specific example of the operational flow **200**, a host may be interacting with an image viewing application that is launched as the client application **120**A, **120**B, **120**C, **120**N, the medical imaging application may be RESOLUTIONMD, available from Calgary Scientific, Inc., Calgary, Alberta, Canada. As such, at **206**, a user interface, such as FIG. **13**A may be presented. From within the user interface of FIG. **13**A, the user may be able to launch a collaboration session by activating a control as shown in FIG. **13**B to join other users to view images using the image viewing application. For example, the collaboration control in FIG. **13**B may present the user interface of FIGS. **7-9** to enable a user to select other users to invite to the collaboration session, as described above.

[0052] Optionally or additionally, the framework **100** may be incorporated into a remote access environment, such as that disclosed in U.S. patent application Ser. No. 12/592,473, entitled "METHOD AND SYSTEM FOR PROVIDING REMOTE ACCESS TO A STATE OF AN APPLICATION PROGRAM." An example of the remote access environment is PUREWEB, available from Calgary Scientific, Inc., Calgary, Alberta, Canada. An application that is remotely accessed by a client computing device may be augmented to include the notification and invitation framework **100** such that a user of the remotely accessed application can rapidly invite others to collaborate.

[0053] FIG. **14** illustrates another operational flow **1400** that may be implemented in the environment of FIG. **1**. While the operational flow **1400** is described in the context of an image viewing application as the client application **120**A, **120**B, **120**C, **120**N, any application may be executed at the client application **120**A, **120**B, **120**C, **120**N. At **1402**, the process begins where a user, at **1404**, launches the image viewing application as the client application **120**A, **120**B, **120**C, **120**N to view imagery on a client computing device. A user interface **1500** (FIG. **15**) may be displayed that includes a control menu **1502**, which may be displayed when activated by a user at **1406**. At **1408**, the user may make a selection among the options presented in the control menu **1502**. At **1410**, it is determined which selection is received within the control menu **1502**.

[0054] If the selection at **1410** is determined to be "OnCall Collaboration," then the OnCall notification client application **118**A, **118**B, **118**C, **118**N of the present disclosure is used to initiate a collaboration session. As such, steps **210**-**214** (FIG. **2**) are performed at **1412**. From within the user interface **1500**, a collaboration invitation window **1504** may be presented at **1414**. At **1416**, the host user may enter text to be communicated as part of the invitation to the selected registrant(s) (e.g., from **214**). A standard invitation message may be used to pre-populate the collaboration invitation window **1504**. The host user may send the invitation by clicking

the send button shown in the collaboration invitation window **1504**. At **1418**, steps **216-220** are performed whereby the selected registrant is joined to the collaboration session.

[0055] If the selection at **1410** is determined to be "OnCall Share," then the OnCall notification client application **118**A, **118**B, **118**C, **118**N of the present disclosure is used to initiate the sharing operation to pass a session to a selected registrant. A user interface such as those shown in FIG. **16** may be displayed. The user interface **1600** illustrates the control menu **1502**, which may be displayed when activated by a user at **1406**. At **1420**, a share invitation window **1604** may be presented to the host user. For example, the share invitation window **1604** may be presented after the host user selects from a list of users presented by the registry service **106**. This process may be similar to the collaboration mode of operation, described above. At **1422**, the host user may enter text to be communicated as part of the invitation to the selected registrant(s). A standard invitation message may be used to pre-populate the share invitation window **1604**. In addition, the host user may select a priority level or state **1606** (e.g., stat, ASAP, critical, normal, review, second opinion, etc.). The host user may send the invitation by clicking the send button shown in the share invitation window **1604**. At **1424**, the invitation may be forwarded to the registry service **106** to enable notifications to be sent to the selected registrant(s) at **216**. The notification may be received by the notification client application **118**A, **118**B, **118**C, **118**N on the registrant's computing device. The registrant may "accept"/"ignore selection," as noted above, such that the response is received and an action performed at **1426**. If the registrant accepts, then at **1428**, the session transfers to the registrant.

[0056] If at **1410** the selection is "Collaboration," then collaboration maybe performed using a conventional collaboration mechanism at **1420**, rather than using the framework **100** of FIG. **1**.

Example Administration of the Framework **100**

[0057] In addition to the above, an administrative module may be layered on top of the framework **100** to administer and control aspects of the framework **100**. The administrative module may provide an interface for organizations (e.g., health care organizations, hospitals, EMRs) to load user data of the individuals (e.g., radiologists) within their organization who will be using the framework **100**. Generally, organization administrators and users can log into the administrative module and specify the devices that are associated with their user account, and the precedence for receiving messages when more than one device is associated with a single user (e.g., an invitation should be sent to a user's tablet before it is sent to their phone, or sent to both simultaneously).

[0058] In an aspect, the administrative module allows an administrator of an organization to set rules by which notifications to users or groups of users are forwarded. The administrative module will allow any user to invite another user to a collaborative session. In some implementations, whether a user can send a collaboration request to another user may be determined by the administrative module. This determination will be made by a series of rules within the administrative module including (but not limited to): the current date/time, the geographical location of the user, a pre-determined on call schedule for the user, or the user manually specifying their status.

[0059] The administrative module may apply rules in accordance with calendaring information stored in the database **103**. Optionally, the calendaring information may be stored with a service, such as GOOGLE. Availability may be automatically turned OFF or ON in accordance with the calendaring information. The administrative module may use presence information in combination with the rules, such that when a user enters a location associated with the rules (e.g., a hospital), notifications are forwarded to the user's device. In some implementations, proximity may be used a measure of availability. For example, a user determined to be within certain areas of the hospital may be considered to be available, whereas if the user is in other areas, the user may be determined to be not available. The administrative module may also ensure the invitations to collaborate are consistent with legal rules regarding privacy, (e.g., if a user wished to share a medical image across organizational boundaries the administrative module would insure that the data was anonymized). Additional workflows may be incorporated.

[0060] With reference to FIG. **17**, there is illustrated a pan-organizational network in which the administrative module of the framework of FIG. **1** may be used to manage notifications. The administrative module may be used within a small organization having one class or user or one location; a large organization having several classes of users or several locations; or be pan-organizational in nature spanning different entities. In an example, healthcare related users might initiate collaboration with third party services attached to the administrative module such as a teleradiology service to get an instantaneous second opinion on a diagnosis. Further, a user can use the administrative module to be either a participant in, or the leader of a collaborative training session run by a third party radiology training service. Other use cases are contemplated.

[0061] Numerous other general purpose or special purpose computing system environments or configurations may be used. Examples of well known computing systems, environments, and/or configurations that may be suitable for use include, but are not limited to, personal computers, server computers, handheld or laptop devices, multiprocessor systems, microprocessor-based systems, network personal computers (PCs), minicomputers, mainframe computers, embedded systems, distributed computing environments that include any of the above systems or devices, and the like.

[0062] Computer-executable instructions, such as program modules, being executed by a computer may be used. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Distributed computing environments may be used where tasks are performed by remote processing devices that are linked through a communications network or other data transmission medium. In a distributed computing environment, program modules and other data may be located in both local and remote computer storage media including memory storage devices.

[0063] FIG. **18** shows an exemplary computing environment in which example embodiments and aspects may be implemented. The computing system environment is only one example of a suitable computing environment and is not intended to suggest any limitation as to the scope of use or functionality.

[0064] With reference to FIG. **18**, an exemplary system for implementing aspects described herein includes a computing device, such as computing device **1800**. In its most basic configuration, computing device **1800** typically includes at least one processing unit **1802** and memory **1804**. Depending

on the exact configuration and type of computing device, memory **1804** may be volatile (such as random access memory (RAM)), non-volatile (such as read-only memory (ROM), flash memory, etc.), or some combination of the two. This most basic configuration is illustrated in FIG. **18** by dashed line **1806**.

[0065] Computing device **1800** may have additional features/functionality. For example, computing device **1800** may include additional storage (removable and/or non-removable) including, but not limited to, magnetic or optical disks or tape. Such additional storage is illustrated in FIG. **18** by removable storage **1808** and non-removable storage **1810**.

[0066] Computing device **1800** typically includes a variety of computer readable media. Computer readable media can be any available media that can be accessed by device **1800** and includes both volatile and non-volatile media, removable and non-removable media.

[0067] Computer storage media include volatile and non-volatile, and removable and non-removable media implemented in any method or technology for storage of information such as computer readable instructions, data structures, program modules or other data. Memory **1804**, removable storage **1808**, and non-removable storage **1810** are all examples of computer storage media. Computer storage media include, but are not limited to, RAM, ROM, electrically erasable program read-only memory (EEPROM), flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to store the desired information and which can be accessed by computing device **1800**. Any such computer storage media may be part of computing device **1800**.

[0068] Computing device **1800** may contain communications connection(s) **1812** that allow the device to communicate with other devices. Computing device **1800** may also have input device(s) **1814** such as a keyboard, mouse, pen, voice input device, touch input device, etc. Output device(s) **1816** such as a display, speakers, printer, etc. may also be included. All these devices are well known in the art and need not be discussed at length here.

[0069] It should be understood that the various techniques described herein may be implemented in connection with hardware or software or, where appropriate, with a combination of both. Thus, the methods and apparatus of the presently disclosed subject matter, or certain aspects or portions thereof, may take the form of program code (i.e., instructions) embodied in tangible media, such as floppy diskettes, CD-ROMs, hard drives, or any other machine-readable storage medium wherein, when the program code is loaded into and executed by a machine, such as a computer, the machine becomes an apparatus for practicing the presently disclosed subject matter. In the case of program code execution on programmable computers, the computing device generally includes a processor, a storage medium readable by the processor (including volatile and non-volatile memory and/or storage elements), at least one input device, and at least one output device. One or more programs may implement or utilize the processes described in connection with the presently disclosed subject matter, e.g., through the use of an application programming interface (API), reusable controls, or the like. Such programs may be implemented in a high level procedural or object-oriented programming language to communicate with a computer system. However, the program(s) can be implemented in assembly or machine language, if desired. In any case, the language may be a compiled or interpreted language and it may be combined with hardware implementations.

[0070] Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the claims.

1. A notification framework, comprising:

a registry service that receives user registration information and an invitation request from a host to join at least one registered user to a session; and

a database that stores the user registration information and the invitation request,

wherein the registry service communicates the invitation request to a push service that provides a push notification of the invitation request to a user device associated with the at least one registered user, and

wherein the framework is adapted to initiate sessions between the host and the at least one registered user on-the-fly.

2. The notification framework of claim **1**, wherein the registry service exposes availability information of the at least one registered user to the host.

3. The notification framework of claim **1**, wherein the invitation request sent by the registry service to join the session includes information to join the user device associated with the at least one registered user to the session.

4. The notification framework of claim **3**, wherein the information to join the user device associated with the at least one registered user to the session comprises a Uniform Resource Locator (URL) of the session.

5. (canceled)

6. (canceled)

7. The notification framework of claim **1**, further comprising a notification application that is executed on the user device, wherein the notification application listens for the invitation request, and wherein the notification application joins the user device to the session.

8. (canceled)

9. (canceled)

10. (canceled)

11. (canceled)

12. The notification framework of claim **1**, wherein the registry service provides for categories of registered users based on an organization structure.

13. The notification framework of claim **1**, wherein the session is one of a collaboration session or application sharing session.

14. (canceled)

15. The notification framework of claim **1**, wherein the registry service provides for a prioritization of registered users to which invitation requests are forwarded.

16. A method of initiating a session between a host and at least one registered user using a notification framework, comprising:

receiving an indication from the host to begin a session;

populating a user interface with the at least one registered user to join the session, the at least one registered user being retrieved by a registration service from a database of registered users;

inviting the at least one registered user to join the session through a notification process that pushes an invitation request to a computing device associated with the at least one registered user; and

joining the at least one registered user to the session in response to an acceptance of the invitation from the at least one registered user.

17. The method of claim **16**, further comprising determining an availability status of the at least one registered user.

18. (canceled)

19. The method of claim **16**, further comprising populating the user interface with a group of the registered users, wherein the group predefined in accordance with an attribute of the registered users.

20. The method of claim **16**, further comprising including a Uniform Resource Locator (URL) of the session in the invitation request.

21. (canceled)

22. The method of claim **16**, further comprising receiving an acknowledgement from the at least one registered user at a user device associated with the host that the invitation request was received by the at least one registered user.

23. The method of claim **16**, further comprising providing:

a notification application that is executed on a user device associated with the at least one registered user, wherein the notification application listens for the invitation request; and

joining the user device to the session using the notification application.

24. The method of claim **16**, wherein the session is one of a collaboration session or application sharing session.

25. (canceled)

26. The method of claim **16**, wherein the registry service provides for a prioritization of registered users to which invitation requests are forwarded.

27. A method of administering a workflow in a notification framework, comprising:

registering users with a registration service of the notification framework, each of the users having a user account;

associating at least one user device with each user account;

applying rules in response to a notification request from a host to invite a second user to join a session;

in response to the rules, forwarding the notification to the second user; and

joining the second user to the session upon receipt of an acknowledgement of the notification from the second user.

28. The method of claim **27**, further comprising:

indicating an order of precedence if there are two or more user devices associated with a user account; and

forwarding notifications to the two or more user devices based on the order of precedence.

29. The method of claim **27**, wherein the rules including determining whether to forward the notification request in accordance with at least one of a current date or time, a geographical location of the second user, a pre-determined schedule for the second user, and the second user manually specifying a status.

30. (canceled)

31. The method of claim **27**, further comprising forwarding the notification to a group of users in accordance with the rules.

32. (canceled)

* * * * *