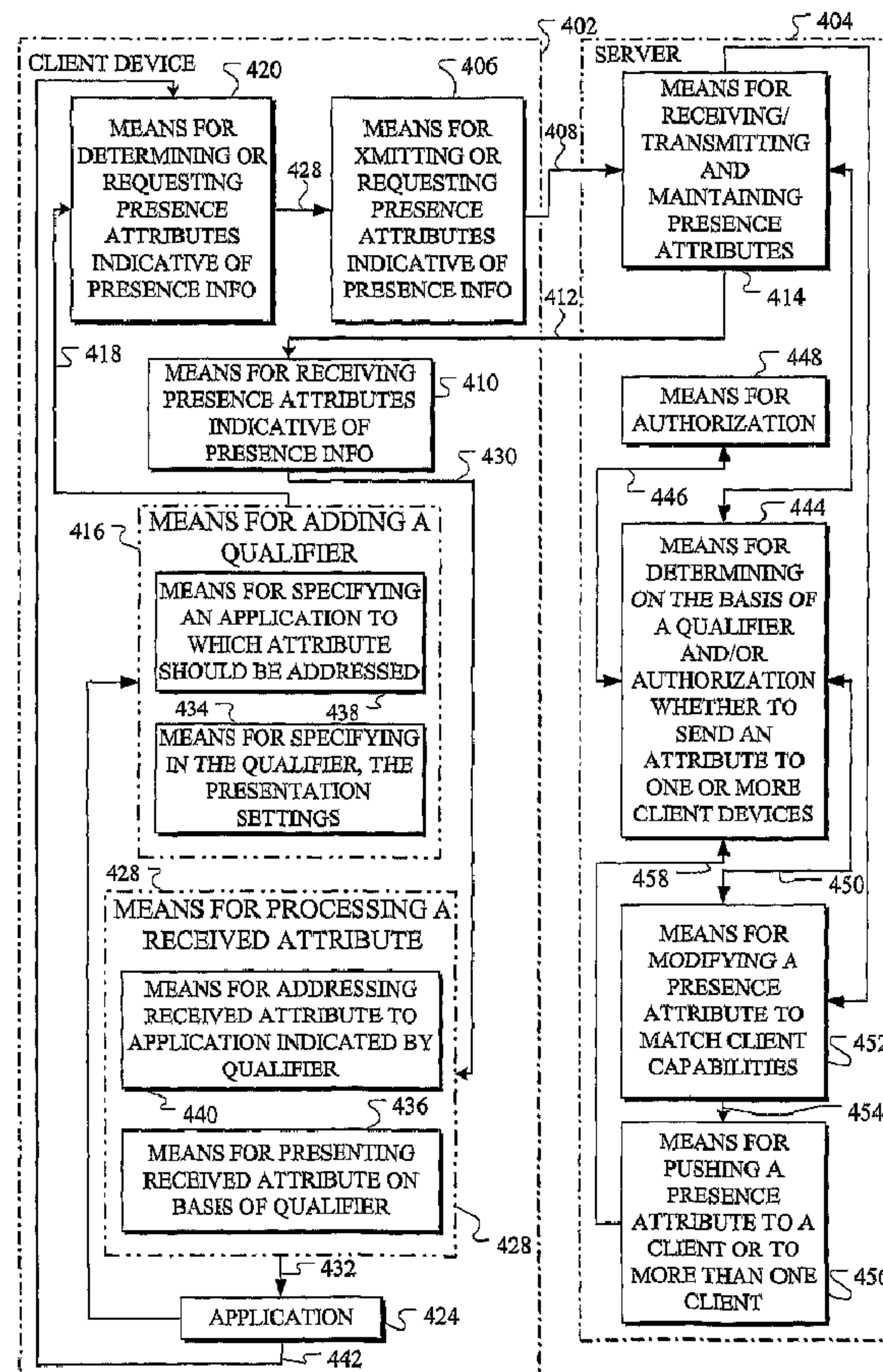




(86) Date de dépôt PCT/PCT Filing Date: 2002/05/10
(87) Date publication PCT/PCT Publication Date: 2002/11/21
(45) Date de délivrance/Issue Date: 2012/10/23
(85) Entrée phase nationale/National Entry: 2003/10/29
(86) N° demande PCT/PCT Application No.: FI 2002/000403
(87) N° publication PCT/PCT Publication No.: 2002/093959
(30) Priorités/Priorities: 2001/05/11 (US60/290,123);
2001/11/07 (FI20012158)

(51) Cl.Int./Int.Cl. *H04W 4/12* (2009.01),
H04L 12/16 (2006.01), *H04L 12/58* (2006.01),
H04W 88/02 (2009.01)
(72) Inventeur/Inventor:
SALOMAEKI, ARI, FI
(73) Propriétaire/Owner:
NOKIA CORPORATION, FI
(74) Agent: SIM & MCBURNEY

(54) Titre : SERVICE MOBILE DE MESSAGERIE INSTANTANEE ET DE PRESENCE
(54) Title: MOBILE INSTANT MESSAGING AND PRESENCE SERVICE



(57) Abrégé/Abstract:

The invention relates to mobile messaging and presence services. According to one aspect of the invention, a client device of the mobile messaging system adds a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the



(57) **Abrégé(suite)/Abstract(continued):**

use of the attribute. A client device receiving a presence attribute processes the received presence attribute according to the qualifier parameters in said received attribute. Another aspect of the invention is the showing of how to assemble and store presence items with names, attributes and values in a single presence set within a role having an associated authorization group of members that have the right to subscribe to the whole or part of the presence set of the same role.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
21 November 2002 (21.11.2002)

PCT

(10) International Publication Number
WO 02/093959 A1(51) International Patent Classification⁷: **H04Q 7/22**, 7/38(74) Agent: **KOLSTER OY AB**; Iso Roobertinkatu 23,
P.O.Box 148, FIN-00121 Helsinki (FI).

(21) International Application Number: PCT/FI02/00403

(22) International Filing Date: 10 May 2002 (10.05.2002)

(25) Filing Language: English

(26) Publication Language: English

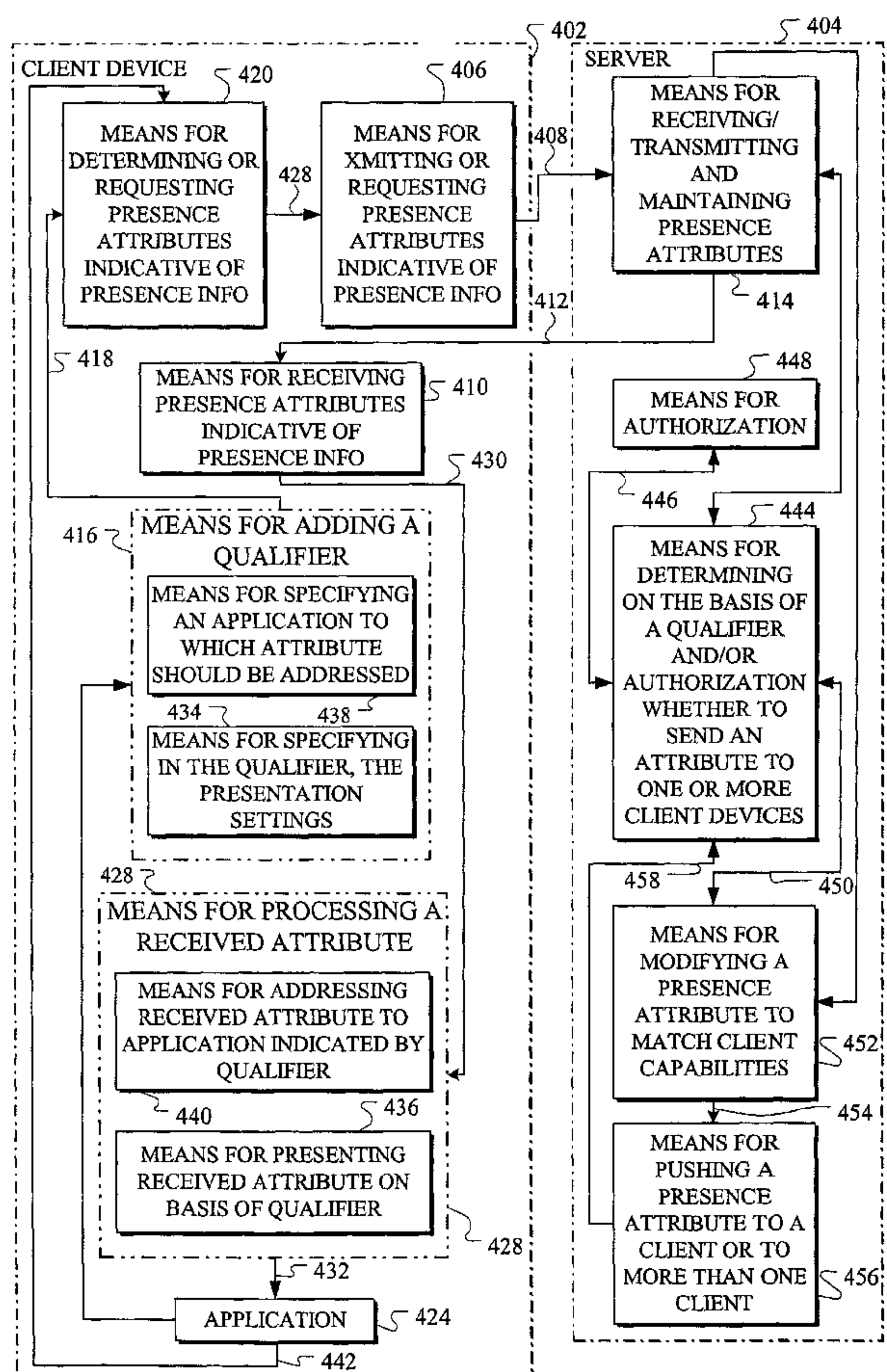
(30) Priority Data:
60/290,123 11 May 2001 (11.05.2001) US
20012158 7 November 2001 (07.11.2001) FI(71) Applicant (for all designated States except US): **NOKIA CORPORATION** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **SALOMÄKI, Ari** [FI/FI]; Ojavinionkatu 10 D 28, FIN-33710 Tampere (FI).(81) Designated States (*national*): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent

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(54) Title: MOBILE INSTANT MESSAGING AND PRESENCE SERVICE



(57) Abstract: The invention relates to mobile messaging and presence services. According to one aspect of the invention, a client device of the mobile messaging system adds a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute. A client device receiving a presence attribute processes the received presence attribute according to the qualifier parameters in said received attribute. Another aspect of the invention is the showing of how to assemble and store presence items with names, attributes and values in a single presence set within a role having an associated authorization group of members that have the right to subscribe to the whole or part of the presence set of the same role.

WO 02/093959 A1

WO 02/093959 A1

(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Declaration under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS,*

Published:

- *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Mobile Instant Messaging and Presence Service

Background of the Invention

The present invention relates to messaging in mobile telecommunication systems and more particularly to presence attributes in a mobile instant
5 messaging and presence service.

An instant messaging service provides the end users with a means for fast, interactive, mainly text-based communication. The utility of instant messaging is greatly enhanced by the addition of a service that will keep track of the online status and availability of your chat partners or "friends"; as well as notify
10 you of changes to their status or availability. This type of service is called a "presence service". In general, *presence* can be considered containing various dynamic information on a user or client connected to the instant messaging service via various means. Examples of this information is reachability, availability and location of the user for communication. The combination of instant messaging
15 and presence services is called an instant messaging and presence service (IMPS). This kind of service has been available for wireline Internet users but the interconnectivity between wireline users and mobile users has been missing.

Wireless Village initiative has been established to define specifications for mobile instant messaging and presence service. The Wireless Village
20 Instant Messaging and Presence Service (IMPS) includes four primary features: presence, instant messaging, groups and shared content. Shared content allows users and operators to setup their own storage area where they can post pictures, music and other multimedia content while enabling the sharing with other individuals and groups in an IM or chat session. The Wireless Village initiative
25 enables both operators and end-users to create and manage groups. Presence is the key enabling technology for the Wireless Village initiative. In the existing Internet-based instant messaging service, the presence values are usually very simple, such as user is active, absent, not willing to communicate etc. These values are selected from the predefined sets of values. A white paper has been
30 published on the Wireless Village mobile IMPS solution: "*Wireless Village, The Mobile IMPS Initiative:White Paper*", dated on 26th April 2001. The existing mobile terminal can be considered a personal tool which reflects the personal status more accurately than a desktop computer. Considering the wide range of information that may be obtained from the user and the mobile terminal, the anticipation of the presence information domain is very difficult. Thus a mechanism
35

should be developed to enable easy usage and addition of new types of presence information.

Disclosure of Invention

An object of the invention is to provide a solution for creation of new presence attributes besides already determined presence attributes.

Another object of the invention is to show how to organize and store presence attributes for use by clients.

According to a first aspect of the invention, a client device of a mobile messaging system adds a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute. A client device receiving a presence attribute processes the received presence attribute according to the qualifier parameters in the received attribute. A presence attribute is a collection of data describing presence information on a certain user and/or a client device, the presence information intended for other users. A presence attribute may also contain information for machine-to-machine communication between the client devices.

In further accord with the first aspect of the present invention, a mobile messaging system comprising at least one client device and a server, wherein the client device comprises means for transmitting presence information as presence attributes to the server and means for receiving presence attributes from the server, the presence information being categorized by a plurality of presence attribute types identified by attribute name, and the server comprises means for maintaining presence information based on the received presence attributes, wherein the client device comprises means for adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and the client device comprises means for processing a received presence attribute according to the qualifier parameters in the received attribute.

According to a second aspect of the invention, the client device composes presence information attributes that are identified by a combination of an authorizer, an attribute name and a qualifier, wherein the authorizer specifies the body responsible for maintaining the attribute and the qualifier specifies the use of the attribute. When receiving a presence attribute, the server and the client device search for already stored attributes containing same identifiers as the received attribute. An attribute already stored is replaced with the received attribute if the combination of identifiers of the received attribute is identical to that of the already stored attribute. Otherwise the received attribute is added without replacing

any previous attribute.

In further accord with the second aspect of the present invention, a mobile messaging system comprising at least one client device and a server, wherein the client device comprises means for transmitting presence information as presence attributes to the server and means for receiving presence attributes from the server, the presence information being categorized by a plurality of presence attribute types identified by attribute name, and the server comprises means for maintaining presence information based on received presence attributes, wherein the client device comprises means for composing a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the attribute and the qualifier specifying the use of the attribute, the server comprises means for searching for an already stored attribute containing same identifiers as a received attribute and means for replacing the already stored attribute with the received attribute if the combination of identifiers of the received attribute is identical to that of the already stored attribute or otherwise adding the received attribute, and the client device comprises means searching for an already stored attribute containing same identifiers as a received attribute and means for replacing the already stored attribute with the received attribute if the combination of identifiers of the received attribute is identical to that of the already stored attribute or otherwise adding the received attribute.

In further accord with the first and second aspects of the present invention, the system is characterized in that the client device comprises means for specifying in the qualifier the presentation settings of the attribute, and the client device comprises means for presenting the received attribute on the basis of the qualifier.

In still further accord with the first and second aspects of the present invention, the system is characterized in that the client device comprises means for specifying in the qualifier the application to which the attribute should be addressed, and the client device comprises means for addressing the received attribute to the application indicated by the qualifier.

Still further in accord with the first and second aspects of the invention, the system is characterized in that the server comprises means for determining on the basis of the qualifier whether to send the attribute to one or more client devices.

According further to the first and second aspects of the invention, the

system is characterised in that the presence attributes received from the client device by the server are stored in a database according to a publisher user in association with a presence group.

In accordance still further to the first and second aspects of the invention, the system is characterized in that each presence attribute is part of an item including an attribute name element and an attribute value. The name element may include an authority string indicative of an authority responsible for keeping the name element and attribute value unique.

According still further to the first and second aspects of the present invention, the system is characterized in that a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

In still further accord with the first and second aspects of present invention, a mobile messaging system is characterized in that a user of the client device as a publisher is able to use the client device or more than one client device in more than one publisher role.

According to a third aspect of the present invention, a mobile client device for mobile messaging system, the client device comprising means for transmitting presence information as presence attributes to a server, the presence information being categorized by a plurality of presence attribute types identified by attribute name, wherein the client device further comprises means for adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

According to a fourth aspect of the present invention, a mobile client device for mobile messaging system, the client device comprising means for receiving presence attributes from a server, the presence information being categorized by, plurality of presence attribute types identified by attribute name wherein the client device further comprises means for adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and means for processing a received presence attribute according to the qualifier parameters in the received attribute.

According to a fifth aspect of the present invention, a mobile client device for mobile messaging system, the client device comprising means for transmitting presence information as presence attributes to the server, and means for receiving presence attributes from the server, the presence information being categorized by a plurality of presence attribute types identified by attribute name,

wherein the client device further comprises means for composing a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the attribute and the qualifier specifying the use of the attribute, means for searching for an already stored attribute containing same identifiers as a received attribute, and means for replacing the already stored attribute with the received attribute if the combination of identifiers of the received attribute is identical to that of the already stored attribute or otherwise adding the received attribute.

According further to the third, fourth and fifth aspects of the present invention, a mobile client device is characterized in that each presence attribute is part of an item including an attribute name element and an attribute value. The name element may include an authority string indicative of an authority responsible for keeping the name element and attribute value unique.

In further accord with the third, fourth and fifth aspects of the present invention, the mobile client device is characterized in that a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

In still further accord with the third, fourth and fifth aspects of the present invention, the mobile client device is characterized in that a user of the mobile client device as a publisher is able to use the client device or more than one client device in more than one publisher role.

According to a sixth aspect of the present invention, a server for a mobile messaging system, the server comprising means for maintaining presence information based on received presence attributes, the presence information being categorized by a plurality of presence attribute types identified by attribute name, wherein the server further comprises means for searching for an already stored attribute containing same identifiers as a received attribute, and means for replacing the already stored attribute with the received attribute if the combination of identifiers of the received attribute is identical to that of the already stored attribute or otherwise adding the received attribute.

In further accord with the sixth aspect of the present invention, the server is characterized in that the presence attributes received from a client device by the server is stored in a database according to a publisher user in association with a presence group.

In still further accord with the sixth aspect of the present invention, the server is characterized in that each presence attribute is part of an item including

an attribute name element and an attribute value. The name element may include an authority string indicative of an authority responsible for keeping the name element and attribute value unique.

Still further in accord with the sixth aspect of the present invention, the server is characterized in that a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group. A user of a client device in communication with the server acting as a publisher is able to use the client device or more than one client device in more than one publisher role.

According to a seventh aspect of the present invention, a presence system, comprises at least one physical device having at least one presence client for enabling a presence user to interact with the system as a publisher or a subscriber, and a server for maintaining valid values of presence sets of attributes of a publisher for access by subscribers according to associated presence groups.

In further accord with the seventh aspect of the present invention, a presence system is characterized in that each attribute is part of an item including an attribute name element and an attribute value. The name element may include a qualifier having information related to attribute usage. The name element may include an authority string indicative of an authority responsible for keeping the name element and attribute value unique.

In still further accord with the seventh aspect of the present invention, the presence system is characterized in that a presence set comprises one or more attributes belonging to a single publisher role in association with a single presence group. The user interacting with the system as a publisher is able to use the presence client or more than one presence client in more than one publisher role. Each attribute may be part of an item including an attribute name element an attribute value.

Still further in accord with the seventh aspect of the present invention, the at least one physical device is a mobile physical device.

According to an eighth aspect of the present invention, a computer-readable medium embodying a computer program for storage in a physical device, wherein the computer program is a presence client program comprising code for enabling a presence user to interact with a presence system as a publisher of at least one presence set of attributes for access by one or more subscribers according to an associated at least one presence group.

In further accord with the eighth aspect of the present invention, the

presence client program is characterized in that the program enables a presence user to interact with the presence system as a subscriber to at least one set of attributes associated with a presence group in which the subscriber is a member.

In still further accord with the eighth aspect of the present invention, the presence client program is characterized in that each attribute is part of an item including an attribute name element and an attribute value. The name element may include a qualifier having information related to attribute usage.

According further to the eighth aspect of the present invention, the presence client program is characterized in that the name element includes an authority string indicative of an authority responsible for keeping the name element and attribute value unique.

In accordance still further with the eighth aspect of the present invention, the presence client program is characterized in that a presence set comprises one or more attributes belonging to a single publisher role in association with a single presence group. A user interacting with the system as a publisher is able to use the presence client program or more than one presence client program in more than one publisher role. Each attribute may part of an item including an attribute name element and an attribute value.

Still further in accord with the eighth aspect of the present invention, the presence client program is characterized in that the physical device is a mobile physical device.

According to a ninth aspect of the present invention, a physical device having a computer program embodied in a computer-readable medium stored therein, is characterized in that the program is a presence client program according to the eighth aspect of the present invention.

According to a tenth aspect of the present invention, a computer-readable medium embodying a data structure for storage in a physical device, wherein the data structure is a presence database for storing valid values of presence sets of attributes of one or more publishers for access by subscribers according to presence groups associated with said presence sets.

In further accord with the tenth aspect of the present invention, a data structure is characterized in that each attribute is part of an item including an attribute name element and an attribute value. The name element may include a qualifier having information related to attribute usage. The name element may include an authority string indicative of an authority responsible for keeping the name element and attribute value unique.

In still further accord with the tenth aspect of the present invention, a presence set comprises one or more attributes belonging to a single publisher role in association with a single presence group.

Further still in accord with the tenth aspect of the present invention, the data structure is characterized in that a user interacting with the physical device as a publisher is able to use the data structure to publish more than one publisher role, each role having distinct presence sets in association with distinct presence groups.

In accordance still further with the tenth aspect of the present invention, a data structure is characterized in that the physical device is a mobile device.

According to an eleventh aspect of the present invention, a physical device having a data structure embodied in a computer-readable medium stored therein, is characterized in that the data structure is a presence database according to the tenth aspect of the present invention.

According to a twelfth aspect of the present invention, an apparatus comprising means configured to transmit presence information as presence attributes to a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, and means configured to add a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

According to a thirteenth aspect of the present invention, an apparatus comprising means configured to receive presence information from a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, means configured to add a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and means configured to process a received presence attribute according to the qualifier parameters in said received attribute.

According to a fourteenth aspect of the present invention, an apparatus comprising means configured to transmit presence information as presence attributes to a server, means configured to receive presence information from the server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, means configured to compose a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the attribute and the qualifier specifying the use of the attribute, means configured to search for an already stored attribute containing the

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same identifiers as a received attribute, and means configured to replace said already stored attribute with said received attribute if the combination of identifiers of said received attribute is identical to that of said already stored attribute or otherwise adding said received attribute.

According to a fifteenth aspect of the present invention, an apparatus comprising means configured to maintain presence information based on received presence attributes, said presence information being categorized by a plurality of presence attribute types identified by attribute name, means configured to receive a presence attribute comprising a qualifier, the qualifier comprising one or more parameters specifying the use of the attribute, and means configured to process a received presence attribute according to the qualifier parameters in said received attribute.

According to a sixteenth aspect of the present invention, a method comprising transmitting presence information as presence attributes to a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, and adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

According to a seventeenth aspect of the present invention, a method comprising receiving presence information from a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and processing a received presence attribute according to the qualifier parameters in said received attribute.

According to an eighteenth aspect of the present invention, a method comprising transmitting presence information as presence attributes to a server, receiving presence information from the server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, composing a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the attribute and the qualifier specifying the use of the attribute, searching for an already stored attribute containing the same identifiers as a received attribute, and replacing said already stored attribute with said received attribute if the combination of identifiers of said received attribute is identical to that of said already stored attribute or otherwise adding said received attribute.

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According to a nineteenth aspect of the present invention, a method comprising maintaining presence information based on received presence attributes, said presence information being categorized by a plurality of presence attribute types identified by attribute name, receiving a presence attribute comprising a qualifier, the qualifier comprising one or more parameters specifying the use of the attribute, and processing a received presence attribute according to the qualifier parameters in said received attribute.

According to a twentieth aspect of the present invention, a computer-readable medium embodying a computer program for storage in a physical device, said computer program comprising computer program code for causing the physical device to transmit presence information as presence attributes, the presence information being categorized by a plurality of presence attributes identified by attribute name, and to add a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

Advantages of the invention are that it is possible to adjust predetermined presence attributes by adding a qualifier. The qualifier may be used to add a new attribute (as an attribute with a qualifier can be uniquely identified, i.e. functionally separated from an attribute with same attribute name but without qualifier). Thus e.g. users or application developers can easily determine new presence attributes best fitting their needs or describing their current actual status without being limited to the predetermined types. The use of the qualifier brings another advantage as it enables the sender of presence information (the owner) to further specify how the presence information is to be used in the receiving client device.

In one embodiment of the invention the application to which the attribute should be addressed is specified in the qualifier. The received attribute is addressed to the application indicated in the qualifier. The further advantage of this embodiment is that the sending client device may define the used applica-

tion and thereby use qualifier to direct certain presence information to a certain application.

Another advantage of the invention is the showing of how to assemble presence items with names, attributes and values in a single presence set
5 within a role having an associated authorization group of members that have the right to subscribe to the whole or part of the presence set of the same role.

Brief Description of the Drawings

In the following, the invention will be described in further detail by means of preferred embodiments and with reference to the accompanying drawings, in which
10

Figure 1 is a block diagram illustrating a mobile IMPS system;

Figure 2 is a signalling diagram illustrating the transmission of presence attributes; and

Figure 3 is a signalling diagram illustrating the usage of a qualifier.

15 Figure 4 shows one embodiment of a mobile messaging system comprising at least one client device and a server, according to the present invention.

Figure 5 shows another embodiment of a mobile messaging system comprising at least one client device and a server, according to the present invention.
20

Figure 6 shows a presence framework, according to the present invention.

Figure 7 shows a presence database, according to the present invention.

25 Figure 8 shows flow diagrams of unsubscribed presence, according to the present invention.

Figure 9 shows subscribed delivery of presence information, according to the present invention.

Figure 10 shows management of user groups and presence sets, according to the present invention.
30

Best Mode for Carrying out the Invention

Figure 1 illustrates a mobile IMPS system. A number of mobile clients (MC) can be connected via a mobile network MNW and possibly one or more intermediary networks ONW to an IMPS server S. Typically the Internet is used as
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the intermediary network, also non-mobile clients C may be served by the IMPS system. The IMPS server S can be, as regards presence services, functionally divided into server elements: A publisher server PS that is the home service element for a publishing client owning the presence information and a subscriber server SS that is the home for a subscribing or requesting client. Thus the client MC is served by both servers; the MC updates its presence information to the PS and acts as a publishing client and on the other hand requests and receives presence information relating to other clients as presence attributes from the subscriber server SS. The server PS maintains presence data and manages its distribution based on the users' publishing preferences relating to presence information. The functions of SS and PS may be carried out on one physical server device or distributed to a plurality of server devices.

It should be noted that the present description focuses on presence related service capabilities. Other important mobile IMPS service capabilities are messaging capabilities, user group management capabilities, content management capabilities, subscriber management capabilities, and client capabilities. Mobile IMPS services are created by using these service capabilities. For instance, a client MC may belong to several user groups and the server S manages the group memberships, handles instant messaging and delivers presence information between the members of the group. One important role of the server is also to control information flow; the server may have filters on the basis of user preferences defining e.g. what presence or other information can be delivered to members of a group 'Friends', to members of a group 'Work colleagues' or publicly to any client.

Various transport layer protocols may be used and the IP protocol is typically used to provide a network layer service. Different lower layer transmission protocols may be used. The mobile network MNW can be any wireless network, such as a cellular network supporting the GSM service, a network supporting also the GPRS service (General Packet Radio Service), a third-generation mobile communication network, such as a UMTS network (Universal Mobile Telecommunications System), a wireless local area network WLAN or a private network. Also short range infrared or radio connections, such as a Bluetooth™ communication, may be used as a part of the communications path between the MC and the server S. The mobile client device MC may be e.g. a mobile station, a PDA device or a laptop computer comprising or being connected to a wireless modem. The mobile IMPS messages may be transferred using a

circuit-switched data call, a packet-switched data transmission context, messaging services such as SMS or MMS (Multimedia Messaging Service), for instance. Figure 2 illustrates the usage of presence attributes. As the mobile client MC has determined 201 one or more presence attributes to be published, it
5 updates 202 presence attributes to the publisher server PS, i.e. publishes one or more presence attributes. The determination 201 of presence attributes can be done when the client is establishing a logical mobile IMPS session with the mobile IMPS server or automatically or by a user initiative when some presence information has changed. For instance, phase 201 may be initiated automatically
10 at a pre-determined time, data, or by a change of user profile at the mobile client MC. When a client MC (A) accesses mobile IMPS services of a server SS, it may request 203 presence information on another client (B). The subscriber server SS requests 204 this information from the publisher server PS (of client A). The PS sends 205 one or more presence attributes to SS, if this is allowed
15 by the publication preferences (of client B). It is possible that the publication preferences set by client B prevent some part of the requested information from being sent (to client A or in general). The SS may also automatically request 204 presence information on the basis of the user preferences (of A) when the client establishes a logical connection with the service of the SS. The SS forwards 206
20 the presence attributes to the receiving client MC (A).

The subscriber server SS (and the publication server PS) typically send the client-originated presence attributes towards the client unmodified. However, there may exist a content adaptation mechanism implemented in the server PS. Content adaptation addresses the issue of modifying a presence attribute in such a way that it matches the client capabilities of the receiving client.
25 In addition to the transmission of presence information as a response to a request from a client, it is also possible to push presence information to available clients MC (that are logically connected to the service) according to the publication preferences. The push-type presence notification can be triggered by three
30 mechanisms: when the publisher server receives an update from the publisher client, when the publisher server detects a change in the attribute value or by implementation-specific internal triggers updating the value.

The client MC is thus configured to update one or more presence attributes to the PS, to receive and handle 207 the presence attributes received
35 from the SS and to present presence information obtained from at least one presence attribute to the user. The MC preferably stores presence information

(presence attribute values) until new presence attribute values are received in an update message used to carry presence attributes (or the client finishes the mobile IMPS session). Further, as will be illustrated in more detail later, the client device may automatically utilize received presence information to adjust its function accordingly. In addition to the signalings shown in Figure 2, an authorization may be requested from the publisher of the presence information before sending presence attributes to a requesting client. Figure 2 does not show any status messages by which the server may respond, e.g. after the message 202.

A *client originated* presence attribute is one which has its value field filled in by the publishing client. A *server originated* presence attribute is one which has its value field filled in by the publisher server. A presence attribute is *client-server originated* when one part of the value field is filled in by the client and the rest by the publisher server. According to a preferred embodiment of the invention, users or organizations may define new presence attributes besides the predetermined set of attributes. The presence attributes can be divided into the following classes:

- Client Status: Presence attributes describing the availability of the client device for communication; network reachability, GPRS attached, on/off status, operator, for instance. Thus the attributes in mobile IMPS service are very different than in IMPS used for non-mobile client devices.
- User Status: Presence attributes describing the availability of the user for communication; ready, meeting, busy, away, on the phone, chatting, do not disturb, for instance.
- Local Information: Presence attributes describing the local environment at the user; local time, noisy/silent environment, in-door, out-door, location of the user, in terms of, for instance, geographical location, visited PLMN, city/street, premises, for instance. For instance, the exact location of the mobile client may be obtained for the local information attribute directly and the availability status (in a meeting, in a summer cottage, etc) may be readily available via user profile settings of the mobile client MC.
- Personal Status: Various personal attributes describing personal user status; mood, personal interests and intentions, for instance.

- Client Capabilities: Presence attributes describing the capabilities of the client device to support different means of communication, different media types and different features.
- User Attributes: Presence attributes allowing the client device or the user to define their own textual presence values and references to external values.
- Extended Presence Information: Vendor specific or service provider dynamically defined non-standard presence attributes which however need to be passed through standard presence servers.

Thus there may be different presence attributes for mobile client devices and actual users. For instance, the user may be defined as not being available for receiving messages but the user's client device is defined as being on-line. The user may also be defined to be able to receive messages and not being online if SMS is used as a bearer.

GENERAL STRUCTURE AND IDENTIFICATION OF PRESENCE ATTRIBUTES

Table 1 describes the general structure of presence attributes. A presence attribute generally comprises an identifier part and a plurality of value fields. The Req field determines whether the element is mandatory M, optional O or conditional C. Attribute information is in XML format (Extensible Markup Language).

Information Element	Req	Type	Description
NameSpec	M	XML	Attribute identity information
Value	M	XML	Value for the attribute

Table 1. Presence Attribute Structure

25

The sub-elements of the Namespec element are described in Table

2.

30

NameSpec	Req	Type	Description
Name	M	String	Name of the attribute
Qualifier	O	String	Information related to the scope of attribute usage
Authority	C	String	The authority responsible for the fact that attribute NameSpec and value field names are unique

Table 2. The NameSpec element

- The name of the attribute is a string given by the information element
- 5 'Name'. The Name information element is defined for all presence attributes in the format defined in Table 3.

Information element	Name
Data type	String
Format	Free text format
Description	Name of a presence attribute

Table 3. The Name element

The format of the Qualifier element is illustrated in Table 4.

Informa- tion element	Qualifier
Data type	String
Format	Free text format
Descrip- tion	Modifies the scope of attribute usage

Table 4. The Qualifier element

5

The Qualifier element is used to specify the scope of the attribute usage. The qualifier can be used especially for two purposes: to add a new attribute or to enable the sender of presence information (the publisher) to specify how the presence information is to be used in the receiving client device. Thus
10 the qualifier string may be used as a parameter for one or more applications in the receiving client device.

For instance, if the publisher wants to limit the knowledge of his exact location (e.g. the street address) to only some of the users (call it group A) and give a more approximate location (e.g. only a city name) to others (call it group
15 B), he may publish a location attribute with the city name to group B. For group A he attaches a Qualifier (say 'My best friends') to the location attribute. This effectively creates a new attribute with Qualifier 'My best friends'. He then includes the street address in this new attribute and publishes it to group A. As these attributes are different, the server PS is able to keep their values separate. Also if
20 a person belongs to both groups A and B, the client device of this person can be configured to distinguish between these two attributes. The client device may be configured to present (and possibly utilize) the attribute according to the group which the user has activated. The possible Qualifier values may be preassigned by the client and the service provider or they may be assigned dynamically by
25 the user (publisher). A service provider may also limit the number of dynamically assigned Qualifier values.

The authority element determines the body who is responsible for keeping the attribute and its contents unique. This relates to the attribute extension mechanism.

Information element	Authority
Data type	String
Format	URL
Description	Identifies the body responsible for the uniqueness of the attribute

5

Table 5. The Authority element

When predetermined presence attributes are used unmodified, the Authority string can be omitted. Use of a Qualifier string is not a modification to the attribute that requires the use of the Authority element. It must be used when
 10 introducing a new attribute (a new Name) or when adding a new value field to an already specified attribute. In both of these cases the attribute is considered to be a new one and the Authority is responsible for maintaining this new attribute.

Generally a Value field name must be unique within an attribute. Thus, the introduction of a new value field to an existing attribute must be handled by the rules set by the body who has defined the attribute. Adding a new
 15 value field transforms the old attribute into a new one. This must be signalled by the presence of the Authority field in order to allow both the new and the old attribute to co-exist. It is also possible that a stakeholder releases an attribute for public maintenance. This kind of attribute is registered by a proper authority, such as IANA (Internet Assigned Numbers Authority), and also signaled in the
 20 Authority field. In this case any stakeholder may register additional value fields for the attribute without having to change the Authority field. The server (PS, SS) does not remove a value field from an attribute even though it would not understand the semantics of the value field. The client MC ignores all the value fields
 25 in the attribute that it does not understand.

An attribute is identified and made unique by the element NameSpec. Figure 3 shows an example of the use of the NameSpec element and the qualifier. A qualifier is determined 301 for an attribute in client device MC1. It is possible that the user determines the qualifier or that the client device MC deter-

mines it. The qualifier may be defined in order to specify the desired the user group, determine how to present the presence information in a receiving client device (MC2), or otherwise to specify how the receiving client device MC2 should use the attribute. It is possible to utilize the user profiles of the mobile client MC when determining the qualifier. For instance, the MC1 composes presence attribute on the basis of the current profile (e.g. on a meeting), calendar entries (meeting ends at 12.00) and the local time. By using the qualifier, the presence attribute can be easily modified to include a lot of useful information for the receiving client MC2. The attribute is sent 302 to the server PS.

PS compares 303 the NameSpec element of the received attribute to already stored attributes. The PS first compares the Authority strings with each other. An attribute not containing an Authority string is different from any attribute that has an Authority string. Next the attribute names are compared. Finally the Qualifier strings are compared. An attribute that does not contain a Qualifier string is different from any attribute that has a Qualifier string. Two attributes are the same only when all of these three comparisons give the same result. Thus it is possible to functionally separate the received attribute with the qualifier from attributes with same attribute name but with a different qualifier.

The publication server PS does this kind of comparison to determine whether the value fields of the received attribute shall replace some already existing presence information or whether the attribute is a new one to be added to the presence information storage of the MC2. On the basis of the comparison, the PS stores 303 the information in the received attribute. The PS replaces previous presence information of an already stored attribute with the presence information of said received attribute if all identifiers of said received attribute are the same as in already stored attribute. Otherwise the PS adds the presence information of said received attribute without replacing any previous information. PS sends 304 the attribute to at least one client device MC2 (either automatically pushes it or as a response to a request from the MC2). According to an embodiment, the qualifier determines a group to which the attribute is directed. Further, the qualifier may be used to present presence information in different ways for private contacts and public contacts in a phone book, for instance. Thus the PS may determine the receiving client devices on the basis of the qualifier. Service capabilities for a dynamic phone book service will be described later, after first describing the client status attributes, user status attributes and personal status attributes more fully below.

Also the receiving client MC2 decides, after a similar comparison 305 as in PS, whether and how to store the information of the received presence attribute. This kind of ternary identification of presence attributes enables very flexible usage, management and creation of presence attributes.

5 There are many ways in which the qualifier may be used to specify the usage of the attribute in the client device MC2. Typically the client device MC is capable of supporting a plurality of applications. According to a first embodiment, the client device MC1 adds a qualifier specifying an application to be used. Application refers generally to any application entity which can be identified e.g. by a port number. The application may be the same as used to process
10 the presence information of the attribute in the client device MC1 or another application. The receiving client device MC2 addresses 305 the received attribute to the application indicated by the qualifier. For instance, by using the qualifier, the same presence information may be sent to a phone book application and a
15 game application. These applications may use the presence information differently and thus it is possible also to tailor attributes exactly for application needs.

 According to a second embodiment, the client device MC1 adds a qualifier specifying the presentation of the attribute. The receiving client device MC2 presents 305 the received attribute on the basis of the qualifier. The qualifier
20 may determine e.g. whether the information is shown to the user at all or not or which parts of the information are shown. The qualifier may also determine various user interface settings such as colors, fonts etc. Thus the UI of the MC2 is configured 305 on the basis of the settings in the qualifier.

25

CLIENT STATUS ATTRIBUTES

 According to a preferred embodiment, the mobile clients MC utilize a presence attribute which describes the current transmission capabilities of a
30 mobile client MC. A structure for this kind of attribute is illustrated in Table 6. This attribute, referred to as a Modem attribute, gives presence information on those user terminal parts or functions that are dealing with mobile bearers.

35

Information Element	Req	Type	Value	Description
Name Spec. Name	M	String	Modem	Name of the attribute
Value	M	XML	See Table 7 below	Value for the attribute. Type is a structure

Table 6. Modem Attribute Structure

Modem.Value	Req	Single/Multiple	Description
Status	M	S	Name of the Value field
CommAddr	O	S	Name of the Value field
CS_Status	O	S	Name of the Value field
PS_Status	O	S	Name of the Value field
Roaming-Status	O	S	Name of the Value field
CS_CallStatus	O	M	Name of the Value field
PDP_ContextStatus	O	M	Name of the Value field

Table 7. Value fields of Modem attribute

5

The Status value field as illustrated in Table 8 indicates the status of the mobile modem.

Informa- tion ele- ment	Status
Data type	Enumerated String
Format	Following values: ON – The modem part of the terminal is powered on OFF – The modem part of the terminal is powered off or out of coverage DIS – The value fields (if any) given by this attribute are invalid. All the value fields obtained from earlier updates are invalid
Descrip- tion	Status field of the modem attribute
Range	ON OFF DIS

Table 8. Status value field of Modem

The Status value field indicates whether the modem is turned on or off. According to a preferred embodiment, a presence attribute includes a DIS indication preferably in the mandatory Status value field of the attribute. When DIS is set in an attribute, all values given in the attribute are invalid. The receiving mobile client MC is thus able to ignore the value fields of the attribute. Also previous values of the presence attribute are removed (and nulled). Thus it is practical to send an attribute with DIS indication but no other value fields. This kind of attribute requires very little space and thus critical bandwidth over the radio interface can be saved. This is very useful especially with attributes describing user attributes.

Referring again to Table 7, the CommAddr value field of the Modem attribute includes the communication address of the modem (MC). It contains two parts: the communication means and the contact address. The means part carries information about the supported communication methods, especially whether the modem supports packet-switched (PS) data, circuit-switched (CS) data or voice, SMS or MMS. The Contact part includes the address, e.g. an MSISDN number.

The CS_Status value field indicates the circuit switched status of the modem (registered or not registered). The PS_Status value field indicates the

packet switched status of the modem (attached or not attached). The RoamingStatus value field indicates the home PLMN (Public Land Mobile Network) and possibly the PLMN in which the modem is currently roaming. The CS_CallStatus value field gives the in-call status of a CS bearer (data or voice;
 5 active or not active). The modem attribute may have a list of these in-call statuses in case if multicall capability is supported by the modem. The PDP_Context Status value field includes information about the PDP (Packet Data Protocol) context, such as QoS (Quality of Service) information.

In addition to above examples, the modem value field may be used to
 10 carry other information related to transmission capabilities of the mobile client. In a first example a maximum bit rate of the mobile client is delivered in the Mode attribute. The receiving client device can then configure its transmission rate so that the maximum bit rate is not exceeded. In a second example the client device determines that only the packet-switched transmission mode is to be used
 15 when sending data files to the client device. A third example is that a roaming device orders that only certain type of communication is enabled (e.g. only voice calls are allowed and data files shall not be sent).

USER STATUS ATTRIBUTES

20 According to one preferred embodiment, an attribute is defined for the willingness of the user to engage in an activity. The activity is specified by the value fields belonging to this Availability attribute. Table 9 illustrates the structure for the Availability attribute.

Information Element	Req	Type	Value	Description
Name Spec. Name	M	String	Availability	Name of the attribute
Value	M	XML	See Table 10 below	Value for the attribute.

25

Table 9. Availability Attribute Structure

Table 10 describes the value fields of the Availability attribute.

Availability- Extension- Value	Req	Single/ Multiple	Description
Status	M	S	Value field name
CommAvail	O	S	Value field name
PhoneAvail	O	S	Value field name
SMSSAvail	O	S	Value field name
MMSAvail	O	S	Value field name
IMAvail	O	S	Value field name
EmailAvail	O	S	Value field name
Image	O	M	Value field name
Text	O	M	Value field name

Table 10. Availability attribute values

- 5 The status value field as illustrated in Table 11 indicates the status of availability information.

Informa- tion ele- ment	Status
Data type	An enumerated String
Format	One of the following values: ENA – The value fields included in this attribute contain up-to-date information. The value fields updated earlier and not included in this attribute are still up-to-date DIS – The value fields (if any) included in this attribute contain invalid information. The value fields updated earlier are invalid.
Descrip- tion	Defines the publishing status of availability attribute
Range	ENA DIS

Table 11. Status field

The Status value field indicates whether the publishing of availability information is enabled or not. The DIS indication may be used as already described to invalidate the values of the Availability attribute. For instance, the server PS may send an availability attribute with DIS indication after the mobile client MC has closed the mobile IMPS session. This kind of message may also be sent when a connection to client is suddenly lost. Thus the receiving mobile client can remove all availability information relating to the user and the client device that are no longer present in the mobile IMPS system.

The CommAvail value field in Table 10 indicates whether the user is willing to engage into any form of remote communication. The PhoneAvail value field indicates whether the user is willing to engage in a telephone call. The SMSAvail value field indicates whether the user is willing to engage in an SMS exchange. The MMSAvail value field indicates whether the user is willing to engage in an MMS (Multimedia Messaging Service) exchange. IMAvail value field indicates whether the user is willing to engage in an IM (Instant Messaging) exchange. The EmailAvail value field indicates whether the user is willing to engage in an EMAIL exchange.

The structure for Image value field is illustrated in Table 12.

Image	Req	Description
ContainedImage	C	An image included in the attribute in transfer encoded form
ReferredImage	C	A URL to the image
Value Field	M	The name of any Value Field in this attribute except Status, Image or Text

Table 12. Image

This value field associates an image with any of the value fields in the Availability attribute except in the Status, Text or Image field. The ContainedImage value field includes the image, the size or the format of the image may however be restricted. The ReferredImage value field includes a URL to resource having the associated image. The ValueField value field defines the value field the image is associated with. For instance, the publisher may associ-

ate an image with the value field PhoneAvail which currently has value 'DISC' (meaning that the user is limitedly available for telephony, for instance) in order to convey pictorial semantic information about the meaning of DISC. The Image value field may have multiple instances in this attribute. Whenever this value
 5 field is included in the attribute, its target value field must also be included in the same attribute. The association is valid only as long as the target value field is valid. When the target value field is updated or invalidated, any old association with this attribute must be discarded by the receiving client.

10 The structure for Text value field is illustrated in Table 13.

Text	Req	Description
Contained-Text	M	A text string
ValueField	M	The name of any Value Field in this attribute except Status, Image or Text

Table 13. Text

Text value field associates a text string with any of the value fields in the Availability attribute except in the Status, Image or Text field. The Text value field includes the text string in ContainedText and the name of the associated value
 15 field in ValueField. The size of the text may be limited in the ContainedText element. For example, the publisher may associate a text with value field PhoneAvail which currently has value 'NAVL' (e.g. 'in meeting until 14:00') in order to convey additional semantic information about the meaning of NAVL. The Text
 20 value field may have multiple instances in this attribute, i.e. the same text may be associated with a multiple value fields. Whenever this value field is included in the attribute, its target value field must also be included in the same attribute. The association is valid only as long as the target value field is valid. When the
 25 target value field is updated or invalidated any old associations with this value field must be discarded by the receiving client. Images and text may also be automatically added to a presence attribute.

PERSONAL STATUS ATTRIBUTES

PersonalStatus attribute indicates the personal status of the publisher. The options and details are specified by the value fields belonging to this attribute. Table 14 illustrates attribute structure for the PersonalStatus.

Information Element	Req	Type	Value	Description
Name-Spec.Name	M	String	Personal-Status	Name of the attribute
Value	M	XML	See Table 15 below	Value for the attribute

Table 14. PersonalStatus attribute structure

Table 15 illustrates the value fields of the PersonalStatus attribute.

Personal-Status.Value	Req	Single/Multiple	Description
Status	M	S	Name of the value field
Text	O	S	Name of the value field
Mood	O	S	Name of the value field
Time	O	S	Name of the value field
Image	O	M	Name of the value field

Table 15. PersonalStatus attribute values

The status value field as illustrated in Table 16 indicates the status of PersonalStatus information.

Informa- tion ele- ment	Status
Data type	An enumerated String
Format	One of the following values: ENA – The value fields included in this attribute contain up-to-date information. The value fields updated earlier and not included in this attribute are still up-to-date DIS – The value fields (if any) included in this attribute contain invalid information. The value fields updated earlier are invalid.
Descrip- tion	Defines the publishing status of location attribute
Range	ENA DIS

Table 16. Status of PersonalStatus attribute

This field indicates whether the publishing of this information is enabled or not. The DIS indication may also be used with the PersonalStatus attribute.

The Text value field indicates the status of the publisher in a free text form. The Mood value field indicates the mood of the publisher. The Time value field gives the local time of the publisher.

According to a preferred embodiment, an image may also be utilized in the PersonalStatus attribute. As already illustrated in Table 12 the Image value field associates an image with any of the value fields in this attribute except in the Status or Image field. For instance, the publisher may associate an image with value field Mood which currently hasvalue 'IN_LOVE' in order to convey pictorial semantic info about the meaning of IN_LOVE. The Image value field may be used in a similar way as already illustrated with attribute Availability.

The present invention can be implemented in the existing client devices and servers. They all have processors and memory with which the inventive functionality described above may be implemented. A computer program may be loaded from an internal or external memory to the processor of the server or the client device, causing, when executed in the processor, the means

to implement the inventive functionality. Also hardware implementation or a combination of software and hardware implementation may be used.

Fig. 4 shows a client device 402 in communication with a server 404, according to the present invention. The client device may be similar to one or more of the mobile clients or the non-mobile client of Fig. 1 or any of the other mobile clients shown in Figs. 2 and 3. Likewise, the server 404 may be similar to the server shown in Fig. 1 or any of the other servers shown in Figs. 2 and 3. The client device 402 includes means 406 for transmitting or requesting presence information as presence attributes to the server on a signal line 408. Transmitting presence information would correspond for instance to the step 302 of Fig. 3 in which presence attributes are sent from MC1 to PS or the step 202 of Fig. 2 in which presence attribute(s) are updated by the MC and sent to the PS. Requesting presence information on the line 408 would be comparable to the request step 203 of Fig. 2 wherein the MC requests a presence attribute from the SS. The transmission on the line 408 from the client device 402 to the server 404 could be similar to the transmission path shown in Fig. 1 from a mobile client (MC) through a mobile network (MNW) via an intermediary network ONW to the IMPS server(s). Or, it could be similar to the path from the non-mobile client C through the intermediary network ONW to the server S. Of course other possible paths are contemplated as well and the invention does not depend on the path of the physical media or combination of physical media used. The client device 402 also includes means 410 for receiving presence attributes from the server 404 on a signal line 412. Such presence information is categorized by a plurality of presence attribute types identified by attribute name.

The server 404 includes means 414 for receiving/transmitting attributes and for maintaining presence information based on the received presence attributes.

According to the invention, the client device 402 additionally includes means 416 for adding a qualifier to a presence attribute wherein the qualifier comprises one or more parameters specifying the use of the attribute. The added qualifier is provided on a signal line 418 for transmission by the means 406 on the line 408 to the server 404. This may be done via a means 420 for determining presence attributes in accordance with instructions received on a line 422 from an application 424. The application can also utilize the means 420 for requesting presence attributes. In either event, a signal may be provided on

a line 426 from the means 420 to the means 406 for transmitting or requesting presence attributes on the line 408. In case the means 416 has added a qualifier, for instance in updating a presence attribute as per step 202 of Fig. 2, the signal on the line 408 will include a presence attribute with a qualifier having one
5 or more parameters specifying use of the attribute.

For handling presence attributes incoming on the line 412 from the server 404, the client device 402 will also include means 428 for processing a received presence attribute on the line 412 from the server 404 according to qualifier parameters in the received attribute. The received presence attribute
10 on the line 412 may be received by the means 410 and provided on a line 430 to the means 428 for processing the received attribute. After processing, the means 428 may provide a signal on a line 432 to the application 424 for further use by the application.

The means for adding a qualifier 416 may include means 434 for
15 specifying in the qualifier presentation settings of the attribute so that the client receiving the attribute from the server 404 will be able to present the attribute on the basis of the presentation settings. Consequently, a client device such as the client device 402 of Fig. 4 will include means 436 for presenting received attributes on the basis of such a qualifier specified by another client device and re-
20 ceived from the server 404 on the line 412.

Likewise, the means 416 may include a means 438 for specifying in the qualifier to be sent to the server 404 an application to which the attribute should be addressed in the receiving client. For such a client device 402 receiving a qualifier specifying the application to which the attribute should be ad-
25 dressed, it will have means 440 for interpreting such an attribute received on the line 430 for addressing a received attribute to the application indicated by the qualifier.

Turning now to the server 404 in more detail, it may also include means 444 for determining on the basis of a qualifier whether to send an attribute to one or more client devices such as specified by a presence group in a presence database in the server. Such a determination may also depend on an authorization provided on a line 446 from a means 448 for providing such au-
30 thorization. If the qualifier and authorization indicate that the attribute should be sent to one or more client devices, then the server 404 will do so, for instance to
35 the client device 402 as well as similar devices, if appropriate.

It may be that a presence attribute intended for a particular client may not match that client's capabilities, according to information known to the server. Such information may be provided for instance by the means 444 on a line 450 to a means 452 for modifying the presence attribute to match the client's capabilities. The modified attribute may be provided back to the means 444 on the line 450. On the other hand, in cases where presence attributes are provided according to a "push" technology, the modified presence attribute may be provided on a line 454 to a means 456 which is capable of taking the appropriate steps to push the modified presence attribute to the client or to more than one client, as appropriate. This may be signalled for instance on a line 458 to the means 444.

It should be realized that the functional blocks shown in Fig. 4 may be carried out using discrete hardware, specialized integrated circuits, microcontrollers, software, firmware, etc., as will be apparent to those of skill in the art. Moreover, the functions attributed to distinct functional blocks in the figure need not be separate but can be incorporated in other blocks by free addition or subtraction of functions into or from other functional blocks. Likewise, the cooperative relationships between the functional blocks may be modified in their order and interrelationships while at the same time carrying out the same end results mentioned above. It should also be realized that the details of the client device and server device shown in Fig. 4 can take other forms which are similar to those shown, according to the invention. Other aspects of the invention can be illustrated in a similar but by no means identical way.

For instance, Fig. 5 shows a client device 502 communicating with a server device 504 with means 506 similar to the means 420 of Fig. 4 for transmitting presence information as presence attributes on a line 508 to a means 510 for receiving and maintaining presence attributes within the server 504, similar to the means 414 within the server 404 of Fig. 4. Likewise, the client device 502 may include means 512 for receiving presence attributes indicative of presence information on a line 514 from the means 510 of the server 504. Similar to the means 420 and 416 of the client device 402 of Fig. 4, the client device 502 of Fig. 5 may include means 516 for composing a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying a body responsible for maintaining the attribute and the qualifier specifying the use of the attribute. The so-composed attribute may be provided on a line 518 to the means 506 for transmittal on the

line 508 to the server 504, as shown. The server 504 may include means 520 that is responsive to the so-composed attribute received on a line 522 from the means 510 for searching for already stored attributes containing the same combination of authorization, attribute name and qualifier. If the combination of
5 identifiers of the received attribute is identical to that of the already stored attribute, for instance stored in a storage means 524, the received attribute is used to replace the already stored attribute over a signal line 526. In this way, if the attribute parameters have changed, the updated parameters will be stored in the storage means 524. Otherwise, the received attribute is added to the storage
10 means as a new attribute. This function may be carried out in the means 520 as described above, or may be carried out in a completely separate means 528 which receives the received attribute on a line 530 from the means 520 and includes functions for replacing the already stored attributes with the received attributes if the combination of identifiers are the same and otherwise adding the
15 received attribute over a connection line 532 between itself and the storage means 524.

The client device 502 will include similar functionalities as just described above as shown for instance by a means 540 which receives incoming attributes on a line 542 from the means 512 and searches for already stored at-
20 tributes containing the same identifiers as the received attribute and means 542 for replacing the already stored attribute with the received attribute if the combination of identifiers of the received attribute is identical to that of the already stored attribute. Otherwise, the received attribute is added to a storage means 544. The means 540 for searching may include the means 542 within or they
25 may be separate as shown in the figure. In the latter case, a signal line 546 provides attribute information concerning the received attribute from the means 540 to the means 542. The storage means 544 may be in bi-directional communication over line 548 with the means 542 for replacing or adding attributes and the line 550 with the means 540 for searching for already stored attributes.

30 As mentioned above, the service capabilities for a dynamic phonebook service embodiment of the present invention will now be described. A dynamic phonebook service can be viewed as a rich call service. It is useful "before the call" to enrich cases where B party's presence information is shown to the A party. In this case, the B party is one or more of the user phonebook en-
35 tries. The presence information can be divided into the same categories as mentioned above, i.e., (1) client availability, (2) user availability, (3) local condi-

tions, (4) personal status, (5) client capabilities, (6) user attributes, and (7) extended presence service:

Conceptually, the Presence System consists of Presence Clients 602, 604, 606, Presence Users 608, 610, 612, Presence User Roles 614, 616, 618, 620, 622, 624, Presence Proxies 626 and Presence Servers 628, 630, as shown in Fig. 6. A Presence Client is the software or program which enables for the user an interaction with the Presence System. The User is a person who interacts with the Presence System using the Presence Client. A physical device 632, 634, e.g., mobile handset or PC, may have one 606, or in special cases, multiple presence client instances 602, 604. A presence client is owned by a single user. A user may own more than one client but then these clients are typically in different devices.

Users 608, 610, 612 are conceptually classified in Publishers and Subscribers. A publisher is the originator of presence information. A subscriber is the receiver of presence information. A User may be both publisher of own presence information and subscriber of some other publisher's presence information at the same time. A user may have one or more Roles. A publisher role is associated with a set of presence values called Presence Set. The presence values of two different presence sets of the same user are independent of each other and are associated with different roles. A subscriber role is the logical receiver of presence information of identical publisher role i.e. of the same presence set.

A Presence Proxy 626 is an optional network element that improves the scalability of the Presence Service. A proxy temporarily stores presence values of different presence sets traveling uplink from the publisher to the server or downlink from the server to a subscriber. When a client comes on-line the proxy may update the client with current presence information. Also when a publisher sends a new presence value to the server the proxy may update all the subscriber clients that are registered with the proxy. A proxy can cache the presence values only temporarily. Even when the presence info is coming from the publisher the proxy cannot assume that all the updates of this presence info is taking place via the same proxy. If the proxy is not aware of the subscriber group associated with a presence set then the proxy may ask for this information from the server.

A presence Server 628, 630 is a network element that maintains valid presence values and information on groups that are associated with each presence set. The server communicates with presence clients either directly or through a proxy. The server informs the proxy about the validity period of presence values cached by the proxy. When the validity period expires the proxy must either discard the values or refresh them from the server. The server assigns the validity periods presence item by item basis by monitoring how frequently the presence values change. The validity period is dynamic i.e. it may change during the lifetime of the presence item.

10 A presence server exchanges presence information also with other presence servers, as shown in Fig. 6. For instance, if the publisher and subscriber belong administratively to different presence servers then the presence info must go through both servers. In case the servers are incompatible there needs to be a gateway function on one or both servers.

15 Figure 7 shows the structure of a presence database 702, according to the invention. A single presence item 704 has three properties: name 708, attributes 710 and value 712. A presence set 714 consists of a single or more presence items. The presence set 714 belongs to a single role 716 of the user. There cannot be more than one presence set for a single role. In addition there is a single authorisation group 718 that belongs to a single role 716. The authorisation group consists of members that have the right to subscribe the whole or a part of the presence set of the same role.

20 The items 704, 720, ..., 722 in a presence set are unique i.e they can be distinguished from each other. The items are primarily distinguished from each other by their name. In case the presence set contains two or more items with the same name then there must be an attribute in each item that carries the id's of these items. The members 724, 726, ..., 728 of a group 718 are unique. Different presence sets in different roles 716, 730, ..., 732 of the same publisher 734 may contain items with the same name or id. Different groups may likewise contain the same members.

30 A role 716 may be identified by a Role ID, Group ID or Presence Set ID. For instance, the Group ID may be assigned by the service provider and is unique within the service providers domain. Therefore, the following ID's would be needed to address individual elements in the presence database:

35 GroupID; ItemName

In case the presence set contains more than one item with the same name the ItemName must have the ItemID attribute assigned.

Note that ID's such as UserID, DeviceID and ClientID are not needed.

5 A. EXEMPLARY PRESENCE PROTOCOL

A.1.0 Unsubscribed Presence (Fig. 8)

The presence information of a user can be obtained separately from messaging services by issuing a query to the presence server, as indicated for
10 instance in the message flows presented in steps 203, 204, 205, 206 of Fig. 2, or by subscribing and receiving presence items as in Fig. 9, or by getting presence items as shown in Fig. 8.

The user of a presence service may, at any suitable time, update his presence information in the presence server by sending update presence message as shown in Fig. 8. As mentioned, a user may issue a get presence message to request the presence information of some other user as also shown in Fig. 8. The presence information is delivered back to the requesting user.
15

The publisher may update his presence information only partially. Similarly, the user may request only partial presence information.

20 If the user does not have authorisation for a requested presence information an empty content is sent to the user.

The authorisation of presence information for a given user is done by including the user into the group corresponding to the presence set. This is described below in the part labeled 'Management of presence database'.
25

A.1.1 UpdatePresence

Direction: Presence Client -> Presence Server

Content Model: (TransactionID, GroupID, Presence)

Attributes: None

30 **Usage:** This primitive updates the values of one or more presence items on the presence server. The presence items to be updated are carried in the information element Presence. If there are items in the Presence that do not exist in the server for the given GroupID then the server allocates storage for these new items and copies the contents from this message. Otherwise the
35 server replaces the old value with the new value.

No UserID or PublisherID is needed in the content. The association between the publisher and the XML-document containing the UpdatePresence primitive is made in the authentication protocol.

5 A.1.2 TransactionID

Content Model: (#PCDATA)

Attributes: None

Usage: This is a unique identifier that associates the request from client to server with the corresponding response from server to client. The client
10 may have sent more than one request to the server before it gets the first response back. The first response does not necessarily refer to the first request. Therefore there needs to be a mechanism that associates requests and responses together. Typically a TransactionID is a sequence number. It is assigned by the client in the request and used by the server in the response.

15

A.1.3 GroupID

Content Model: (#PCDATA)

Attributes: None

Usage: This id uniquely identifies within the service provider domain
20 the publisher role including the authorisation group and presence set. It is assigned by the presence service provider.

A.1.4 UpdateStatus

Direction: Presence Server -> Presence Client

25 **Content Model:** (TransactionID, StatusCode)

Attributes: None

Usage: This primitive is the response from the presence server to the client UpdatePresence request. The StatusCode may have following values: not supported, new allocation, success, failure.

30

A.1.5 GetPresence

Direction: Presence Client -> Presence Server

Content Model: (TransactionID, ((GroupID, PresenceNames?)*)) | PresenceNames?)

35 **Attributes:** None

Usage: This primitive is used to request presence information from the presence server. There may be zero or more GroupIDs. For each GroupID there may be coupled an optional PresenceNames. When the GroupID is not used then the request scope is all the groups the user is a member. The server
 5 associates the requesting user's identity to the request by the authentication protocol. The PresenceNames is defined later in this document. It lists those presence items by name from which the value is requested. It is optional. It is either coupled with GroupIDs or may be alone when no GroupIDs are listed. When coupled with GroupIDs the server limits the search of the presence items
 10 for the given group. When not present the values of all presence items is requested.

A.1.6 PresenceItems

Direction: Presence Server -> Presence Client

15 **Content Model:** (TransactionID, StatusCode, (GroupID, Presence)*)

Attributes: None

Usage: This primitive supplies the list of presence items requested and the result status of the request. The element Presence is the presence set corresponding to a given GroupID and is defined later in this document. The
 20 StatusCode may have following values: not authorised, item not available, success, failure.

A.2.0 Subscribed Presence (Fig. 9)

Another mechanism to deliver presence information is to subscribe
 25 someone's presence information. The message flow is presented in Fig. 9.

The requesting user sends a subscribe presence message A.2.1 to the presence server to subscribe someones presence information.

When the subscription of presence information is complete, the requesting user will receive new presence information A.2.2 initially and always
 30 when the other party updates its presence information.

When the requesting user does not any more want to receive the presence information, he may unsubscribe A.2 the presence information. Alternatively, the presence information may be subscribed to a time period and the unsubscribe message is not needed.

35 The requesting user may subscribe only part of the presence information that he is authorised to get.

A.2.1 SubsPresence

Direction: Presence Client -> Presence Server**Content Model:** (TransactionID, SubsPeriod?, ((GroupID, Presence-
5 Names?)*)) | PresenceNames?)**Attributes:** None

Usage: This primitive is used to subscribe presence information from publisher roles for which the subscriber is authorised. The optional GroupID specifies the publisher role which is subscribed. When the GroupID is missing
10 then all the roles for which the subscriber is authorised are subscribed. Each GroupID may be associated with a PresenceNames which limits the subscribed items within the group to those listed in the PresenceNames. The optional SubsPeriod specifies the length in time for the subscription. When it is missing the subscription lasts until an corresponding UnsubsPresence primitive is invoked or
15 until the service provider terminates subscription. The PresenceNames specifies the presence items that are subscribed from the authorised set. When it is missing then all the presence items that the user is authorised for within the presence set (GroupID) are subscribed. When used alone without a GroupID then the named items from all authorised groups are subscribed. PresenceNames is
20 defined later in this document.

The identity of the subscriber is discovered in the authentication protocol.

A.2.2 SubsPeriod

Content Model: (#PCDATA)**Attributes:** None

Usage: This defines the length of the subscription period. The time unit is TBD. Alternatively the content may indicate the date when the subscription ends.

30

A.2.3 PushPresence

Direction: Presence Server -> Presence Client**Content Model:** (GroupID, Presence)+**Attributes:** None

Usage: This primitive pushes the subscribed presence items that have been modified by the publisher to the users. The GroupID identifies the role.

5 A.2.4 UnsubsPresence

Direction: Presence Client -> Presence Server

Content Model: (TransactionID, ((GroupID, PresenceNames?)*) | PresenceNames?)

Attributes: None

10 **Usage:** This primitive is used to unsubscribe presence information. The termination of subscription may be limited to given groups and can further be limited to given presence items. When no GroupID is given it is possible to limit the subscription termination for the named presence items in all the groups. When no GroupID and no PresenceNames is given then the whole subscription
15 of the user is terminated.

A.2.5 SubsStatus

Direction: Presence Server -> Presence Client

Content Model: (TransactionID, StatusCode, (GroupID, Presence-
20 Names?)*)

Attributes: None

Usage: This primitive returns the StatusCode for the unsubscribe operation and lists the presence items and groups that are still subscribed. The StatusCode may have following values: not supported, non-existent item, non-
25 subscribed item, success, failure.

A.3.0. Management of Presence Database

The presence user may manage his user groups and presence sets in the presence server.

30 A role containing a user group and presence set is created using CreatePresGroup message A.3.1. The presence server will reply with PresGroupStatus message A.3.6 indicating the status of the requested operation and an id for the created group. A PresenceInfo message A.3.7 is sent to members of the group indicating the presence items they are authorised to get or sub-
35 scribe.

The presence user may request group info with the GetPresGroup-Status message A.3.8. The group info request is limited to the owner of the group.

5 The presence user owning the user group may add and delete members of the group or presence items for the presence set.

The publisher may send delete a group by message DeletePres-Group.

10 A.3.1 CreatePresGroup
Direction: Presence Client -> Presence Server
Content Model: (TransactionID, MemberList, Presence)
Attributes: None

15 **Usage:** This primitive requests the server to create a role in the presence server. The authorisation group contains the members in the memberlist and the presence set is contained in Presence.

A.3.2 MemberList
Content Model: (MemberDescription)+
Attributes: None
 20 **Usage:** The list of members. The description is originated from the user.

A.3.3 MemberDescription
Content Model: (UserOriginatedMD?, ServerOriginatedMD?)
 25 **Attributes:** None
Usage: The user originated part is a description of a member as seen by the user. The server originated part is a description of a member as stored in the server database.

30 A.3.4 UserOriginatedMD
Content Model: (#PCDATA)
Attributes: None
Usage: This is a user originated means to identify a person. It may be a name, an MSISDN of one of the phones of the target person, an email address, a SIP address etc. It may also be a combination of these. The dataformat
 35

of the description is not within the scope of this document but known formats such as vCard should be used.

A.3.5 ServerOriginatedMD

5 **Content Model:** (#PCDATA)

Attributes: None

Usage: This is a server originated means to identify a person. It may be a name, an MSISDN of one of the phones of the target person, an email address, a SIP address etc. It may also be a combination of these as stored in the
10 server database. The dataformat of the description is not within the scope of this document but known formats such as vCard should be used.

A.3.6 PresGroupStatus

Direction: Presence Server -> Presence Client

15 **Content Model:** (TransactionID, StatusCode, (GroupID, MemberList, PresenceNames)*)

Attributes: None

Usage: This primitive returns the GroupID's of the currently existing publisher roles together with the group members and presence item names for
20 the role. The server has assigned a new GroupID for the new role if the operation was successful. The server has filled the server originated part of the memberlist. This allows the publisher to verify that the group contains the right members. The server should not give any confidential or personal information in the memberlist beyond the level already existing in the user originated part or a level
25 that is needed to uniquely identify a person. This is TBD. The StatusCode may get following values: not supported, unknown member, unknown presence item, success, failure.

A.3.7 PresenceInfo

30 **Direction:** Presence Server -> Presence Client

Content Model: (GroupID, Presence?)+

Attributes: None

Usage: This primitive advertises the new presence items to the authorisation group. The message contains all the presence items of the given authorisation group – both subscribed and unsubscribed. This message is sent to
35 new members in the group if the group membership has changed or to all the

members of the group if new presence items have been added. The message is sent to removed group members so that there is no presence set (Presence) associated with the GroupID.

5 A.3.8 GetPresGroupStatus

Direction: Presence Client -> Presence Server

Content Model: (TransactionID, GroupID*)

Attributes: None

10 **Usage:** This primitive requests the PresGroupStatus message from the server. The user may only request info from his own groups. The GroupID limits the info to the given groups. When no GroupID exist then the status is returned from all the groups owned by the requestor.

15 A.3.9 AddMembers

Direction: Presence Client -> Presence Server

Content Model: (TransactionID, (GroupID, MemberList)+)

Attributes: None

20 **Usage:** This primitive requests the server to add the named members into given groups.

25 A.3.10 RemoveMembers

Direction: Presence Client -> Presence Server

Content Model: (TransactionID, (GroupID, MemberList)+)

Attributes: None

30 **Usage:** This primitive requests the server to remove the named members from the given groups. The MemberList is filled with the server originated info.

35 A.3.11 DeletePresGroup

Direction: Presence Client -> Presence Server

Content Model: (TransactionID, GroupID*)

Attributes: None

Usage: This primitive requests the server to remove one or more of the publisher roles. The GroupID identifies the role that is to be removed. When no GroupID is given then all the publisher roles are removed.

A.3.12 AddPresence

Direction: Presence Client -> Presence Server**Content Model:** (TransactionID, (GroupID, Presence)+)**Attributes:** None

5 **Usage:** This primitive requests the server to add given presence items into given roles.

A.3.13 RemovePresence

Direction: Presence Client -> Presence Server

10 **Content Model:** (TransactionID, (GroupID, Presence?)+)

Attributes: None

Usage: This primitive requests the server to remove given presence items from the given roles. When there is no Presence element associated with GroupID then all the presence items are removed from the role.

15

A.3.14 Dynamic Client Change

 A publisher or subscriber may change his client at any time. Typically also the client device changes. In a rare case the user may only change the client instance in the same device. The new device may be a TE and the old a MT
 20 or vice versa. Also change to a new MT is possible. The client change requires the user to copy or synchronize his presence data from the old client to the new client. In case of a publisher there might be some client specific presence data that is static for a given client and is not included in the synchronisation set. The synchronisation may take place locally or may be network assisted. In any case
 25 the existing synchronisation protocols should be used. This is not within the scope of the presence protocol.

 Another issue brought by the subscriber client change is the registry of the new client to be the active client that receives the presence related push messages. The registry may take place automatically (no user confirmation
 30 needed), semi-automatically (user confirmation required) or manually (user must initiate the registry) depending whether

- User activates a new client in the same device (automatic);
- User SIM changes to the new device (automatic);
- User has a different SIM in the new device but only the new device
 35 is turned on (semi-automatic); or

- User has a different SIM in the new device and both the new device and old device are on (manual).

In all the cases the registry may be handled by lower level protocols. For example if the SIP-protocol is the chosen transport protocol for presence documents then this protocol can also be used for the registry.

A.4.0 DTD for the Presence Protocol

```

10      <!-- Root element -->

      <!ELEMENT PresProtocol ( UpdatePresence | UpdateStatus | Get-
Presence | Presenceltems | SubsPresence | PushPresence | UnsubsPrecence |
SubsStatus | CreatePresGroup | PresGroupStatus | PresenceInfo | GetPres-
15  ence | RemovePresence) >

      <!ATTLIST PresProtocol Version NMTOKENS #REQUIRED >

      <!ELEMENT UpdatePresence (TransactionID, GroupID, Presence) >
20

      <!ELEMENT TransactionID (#PCDATA) >

      <!ELEMENT GroupID (#PCDATA) >

      <!ELEMENT Presence (#PCDATA) >
25

      <!ELEMENT UpdateStatus (TransactionID, StatusCode) >

      <!ELEMENT StatusCode (#PCDATA) >
30

      <!ELEMENT GetPresence (TransactionID, ((GroupID,
PresenceNames?)* | PresenceNames?) >

      <!ELEMENT PresenceNames (#PCDATA) >
35

      <!ELEMENT Presenceltems (TransactionID, StatusCode, (GroupID,
```

43

Presence)*) >

<!ELEMENT SubsPresence (TransactionID, SubsPeriod?, ((GroupID, PresenceNames?)*) | PresenceNames?) >

5

<!ELEMENT SubsPeriod (#PCDATA) >

<!ELEMENT PushPresence ((GroupID, Presence)+) >

10

<!ELEMENT UnsubsPresence (TransactionID, ((GroupID, PresenceNames?)*) | PresenceNames?) >

<!ELEMENT SubsStatus (TransactionID, StatusCode, (GroupID, PresenceNames)*) >

15

<!ELEMENT CreatePresGroup (TransactionID, MemberList, Presence) >

<!ELEMENT MemberList ((MemberDescription)+) >

20

<!ELEMENT MemberDescription (UserOriginatedMD?, ServerOriginatedMD?) >

<!ELEMENT UserOriginatedMD (#PCDATA) >

25

<!ELEMENT ServerOriginatedMD (#PCDATA) >

<!ELEMENT PresGroupStatus (TransactionID, StatusCode, (GroupID, MemberList, PresenceNames)*) >

30

<!ELEMENT PresenceInfo ((GroupID, Presence?)+) >

<!ELEMENT GetPresGroupStatus (TransactionID, GroupID*) >

35

<!ELEMENT AddMembers (TransactionID, (GroupID, MemberList)+)

>

<!ELEMENT RemoveMembers (TransactionID, (GroupID, MemberList)+) >

5 <!ELEMENT DeletePresGroup (TransactionID, GroupID*) >

<!ELEMENT AddPresence (TransactionID, (GroupID, Presence)+) >

10 <!ELEMENT RemovePresence (TransactionID, (GroupID, Presence?)+) >

<!-- End of DTD -->

B. EXEMPLARY PRESENCE CONTENT FORMAT

15 As stated above, the presence content can be divided in the following classes:

Client Availability: Presence attributes describing the availability of the client for communication, for instance, network reachability, GPRS attached, on/off status.

20 User Availability: Presence attributes describing the availability of the user for communication, for instance, ready, meeting, busy, away, in call, chatting, don't disturb, etc.

Local Conditions: Presence attributes describing the local environment at the user, for instance, local time, noisy/silent environment, in-door, out-door, location of the user, in terms of, for instance, geographical location, visited
25 PLMN, city/street, premises.

Personal Status: Various personal attributes describing personal user status, for instance, mood, personal interests and intentions.

Client Capabilities: Presence attributes describing the capabilities of the client, for instance, to support different means of communication, different
30 media types and different features.

User Attributes: Presence attributes allowing the client or the user to define their own textual presence values and references to external values.

Extended Presence Service: Service provider dynamically defined non-standard presence attributes which however need to be passed through
35 standard presence servers and proxies.

B.1. DESIGN GOALS

The bulk of presence communication is sending the changes in the value part of presence items to the subscribers. Often only a single value has changed. In order to minimize the amount of transferred data the design goal is to keep the hierarchical representation of presence items as flat as possible. For this reason the presence items are scoped under the presence classes described above. Instead the classes may be given in the presence items as an optional attribute.

10 D.2 COMMON ATTRIBUTES

The presence elements contain a variety of attributes most of which can be used in any presence item.

15 D.2.1 Version

Content Syntax: NMTOKENS

Mandatory: yes

Usage: This gives the version of the presence content format

20 D.2.2 Class

Content Syntax: NMTOKEN

Mandatory: no

Usage: This indicates the class the attribute belongs to. Possible values are: CLIENT_AVAILABILITY, USER_AVAILABILITY, LOCAL_CONDITIONS, PERSONAL_STATUS, CLIENT_CAPABILITIES, USER_ATTRIBUTES, EXT_PRES_SERVICE.

D.2.3 ID

Content Syntax: PUBIDLITERAL

Mandatory: no

Usage: This is a unique ID for a named presence item. It is assigned by the client.

35 D.2.4 Cacheability

Content Syntax: NMTOKEN

Mandatory: no

Usage: This indicates whether the presence item can be cached by proxies or not. The possible values are: YES, NO. It is assigned by the client. If this attribute is missing a value of NO is assumed.

5

D.2.5 ValidityPeriod

Content Syntax: NMTOKEN

Mandatory: no

10

Usage: This is a validity period for the cached presence item. The value is time in seconds. It is assigned by the presence server.

D.2.6 DeviceName

Content Syntax: NMTOKEN

15

Mandatory: no

Usage: This is the name of the client device. It is assigned by the client.

D.2.7 Accuracy

20

Content Syntax: NMTOKEN

Mandatory: no

Usage: This is the accuracy of a positioning device. It is given in meters.

25 D.2.8 ImageType

Content Syntax: NMTOKEN

Mandatory: no

30

Usage: This is the content encoding of an image. Some possible values are: JPEG, GIF, BMP.

D.2.9 SoundType

Content Syntax: NMTOKEN

Mandatory: no

35

Usage: This is the type of sound codec used to encode the sound. Some possible values are: AMR, EFR, MP3, AAC, MIDI

- D.2.10 ExtRef
Content Syntax: PUBIDLITERAL
Mandatory: no
5 **Usage:** This is a URL giving an external reference.
- D.2.11 ExtRefChange
Content Syntax: NMTOKEN
Mandatory: no
10 **Usage:** This indicates that the content of an external reference has changed. The possible values are: YES, NO
- D.2.12 ContentChange
Content Syntax: NMTOKEN
15 **Mandatory:** no
Usage: This is a counter from 0 to 255 which indicates a change in the content value. The server or proxy may store the contents (but is not required to) of the last 32 values. Same values for two contents within the last 32 values should correspond to same content
20
- D.3 Client Availability
- D.3.1 DeviceOn
25 **Content Model:** (#PCDATA)
Attributes: Class, ID, Cacheability, ValidityPeriod, DeviceName
Usage: This gives the on/off status of the user terminal. The publisher adds this item into the role in the server by using the group management messages. Thereafter the value part is maintained by the network. The user may have more than one terminal in his presence information. In this case the use of ID attribute is mandatory. The content can have values "ON" or "OFF". When the user's terminal is on but outside network coverage the network assigns value "OFF" for this item.
30
35

- 5 D.3.2 DeviceRoaming
 Content Model: (#PCDATA)
 Attributes: Class, ID, Cacheability, ValidityPeriod, DeviceName
 Usage: This indicates to the subscriber that the publisher is
 roaming in a visited network. The user may have more
 than one terminal in his presence information. In this
 case the use of ID attribute is mandatory. The content
 can have values "YES" or "NO"
- 10 D.3.3 NetworkType
 Content Model: (#PCDATA)
 Attributes: Class, ID, Cacheability, ValidityPeriod, DeviceName
 Usage: This indicates the type of mobile network the publisher
15 is currently attached. The content can have values
 "2G", "3G-99", "3G-R4" or "3G-R5". The user may have
 more than one terminal in his presence information. In
 this case the use of ID attribute is mandatory.
- 20 D.4 User Availability
- D.4.1 UserStatus
 Content Model: (#PCDATA)
 Attributes: Class, ID, Cacheability, ValidityPeriod
25 **Usage:** This indicates the current status of the publisher in
 terms of amount of distraction he is willing to accept.
 The following values are defined: "available", "silent",
 "in-car", "busy".
- 30 D.4.2 PreferredContact
 Content Model: (#PCDATA)
 Attributes: Class, ID, Cacheability, ValidityPeriod
 Usage: This indicates what is the current preferred contact
35 method for the publisher. Following values are defined:
 "PHONE", "VOICE_MESSAGE", "MESSAGE", "MAIL",
 "NO_CONTACT".

D.4.3 PreferredDefaults

Content Model: ((TimePeriod, PrefCont)*)

Attributes: Class, ID, Cacheability, ValidityPeriod

5 **Usage:** This is presence metainformation that the publisher
may send to presence server. The information is
associated to a role as other presence information but
this item is not available to subscribers. Instead it
controls the values of the element 'PreferredContact'. It
10 specifies a default preferred contact for given time
periods. User specified time periods may overlap or a
time period may even completely enclose another. The
server changes the value of PreferredContact element
according to the PreferredDefaults at the expiration of
15 given periods. It however does not block a user
changing the PreferredContact value directly. Also the
user changing the PreferredContact value directly does
not block the server changing it again when a period
expires. The user may remove the default mechanism
20 by sending this element with empty contents to the
server.

D.4.4 TimePeriod

25 **Content Model:** (PeriodStart, PeriodEnd, RepetitionPeriod?, Period-
Precedence)

Attributes: None

Usage: This describes the start of a period e.g. start time, the
end of the period e.g. end time, the repetition period e.g.
'DAY' and the precedence of the period.

30

D.4.5 PeriodStart

Content Model: (#PCDATA)

Attributes: None

35 **Usage:** This is the start period. It may be Time, Time-
DayofWeek, Time-DayofMonth or a full date..

- D.4.6 PeriodEnd
Content Model: (#PCDATA)
Attributes: None
Usage: This is the start period. It may be Time, Time-
5 DayofWeek, Time-DayofMonth or a full date. The
 resolution must be the same as in PeriodStart.
- D.4.7 RepetitionPeriod
Content Model: (#PCDATA)
10 **Attributes:** None
Usage: This gives the repetition period for the start-end. It must
 be one of the following values: "DAY", "WEEK",
 "MONTH". When this element is not included in the
15 period description then it is assumed that no repetition is
 applied.
- D.4.8 PeriodPrecedence
Content Model: (#PCDATA)
Attributes: None
20 **Usage:** This element resolves the conflict between overlapping
 periods. It can have a numeric value between 0 and 9.
 Number 0 is the highest precedence. When two or
 more periods overlap then the server takes the contact
 preference associated with the highest precedence
25 value.
- D.4.9 PrefCont
Content Model: (#PCDATA)
Attributes: None
30 **Usage:** This indicates what is the period associated default
 preferred contact method for the publisher. It can have
 the same values as the element 'PreferredContact'.
- D.5 Local Conditions
35

D.5.1 LocalTime**Content Model:** (#PCDATA)**Attributes:** Class, ID, Cacheability, ValidityPeriod**Usage:** This gives the local time of the publisher

5

D.5.2 MeasuredLocation**Content Model:** (#PCDATA)**Attributes:** Class, ID, Cacheability, ValidityPeriod, Accuracy

Usage: This gives the measured position of the client device. The measurements may be either sensor based (e.g. GPS) or network based or combination of both. The attribute Accuracy gives indication of the average positioning accuracy achieved by the method. The content includes at least the lateral position (x- and y-coordinates) but may include also the vertical position. If the service provider supports 'ConvertedLocation' described below then the MeasuredLocation may be input information for the service provider conversion process e.g. map matching.

10

15

20

D.5.3 ConvertedLocation**Content Model:** (#PCDATA)**Attributes:** Class, ID, Cacheability, ValidityPeriod

Usage: This information is typically originated from the service provider but may also originate from the publisher. It gives the location of the user given in a human understandable text form such as a name of a street. The information is derived by converting a measured position into this form by e.g. map matching.

25

30

D.5.4 StatedLocation**Content Model:** (#PCDATA)**Attributes:** Class, ID, Cacheability, ValidityPeriod

Usage: This is the location of the publisher as stated by the publisher himself. The content is a short text string.

35

- 5 D.5.5 UserEnvironment
 Content Model: (EnvAttributes+)
 Attributes: Class, ID, Cacheability, ValidityPeriod
 Usage: This gives some environmental attributes about the user.
- 10 D.5.6 EnvAttributes
 Content Model: (#PCDATA)
 Attributes: None
 Usage: The attributes defined are: "INDOOR", "OUTDOOR", "QUIET", "NOISY", "ALONE", "IN_GROUP".
- 15 D.6 Personal Status
- 20 D.6.1 StatusText
 Content Model: (#PCDATA)
 Attributes: Class, ID, Cacheability, ValidityPeriod
 Usage: This is a short text (about 30 characters) that the user may write.
- 25 D.6.2 StatusImage
 Content Model: (#CDATA)
 Attributes: Class, ID, Cacheability, ValidityPeriod, ImageType
 Usage: This is an image the user may attach to his status information. It is carried in the XML content in a transfer encoded form e.g. base64. The ImageType attribute describes the content encoding of the image e.g. jpeg.
- 30 D.6.3 StatusSound
 Content Model: (#CDATA)
 Attributes: Class, ID, Cacheability, ValidityPeriod, SoundType
 Usage: This is a short (about 5 to 30 seconds) sound clip the user may attach to his status information. It is carried in the XML content in a transfer encoded form e.g. base64. The SoundType attribute describes the content encoding of the sound e.g. AMR, MP3, AAC, MIDI etc.
- 35

D.7 Client Capabilities

5 The client capabilities in the context of presence mean the capability of the device hosting the client for various types of human to human communication. This is very much different and simpler issue than the case of allowing an application software to take maximum advantage of the existing hw and sw capabilities of the client device.

10 The classes of human to human communication are: messaging, e-mail, voice call and multimedia call. In particular presence is excluded from the communication classes. The purpose of presence is to make others aware of the communication means and other user attributes but not to be a two way communication means itself. For this reason the use of the term 'Client Capabilities' to classify presence information is somewhat misleading.

15 The client capabilities are scoped with the network capabilities. This means for example that the publisher has the video call capability only when his client device has this capability AND the network he is currently roaming supports this capability. This makes the client capability information dynamic.

20

D.7.1 MessagingCapabilities

Content Model: (MessType*)

Attributes: Class, ID, Cacheability, ValidityPeriod

25 **Usage:** This gives the dynamic messaging capability list of the client device. An empty list means that no messaging capabilities currently exist.

D.7.2 MessType

Content Model: (#PCDATA)

30 **Attributes:** None

Usage: This gives the messaging capability type of the client device. The content may be one of the following: "SMS", "MMS" or "X-message application name". The field message application name is a device specific messaging method e.g. smart messaging.

35

- D.7.3 EmailClient
Content Model: (EmailClientType*)
Attributes: Class, ID, Cacheability, ValidityPeriod
Usage: This gives the dynamic e-mail capabilities of the client device. An empty list means that no e-mail capabilities currently exist.
- 5
- D.7.4 EmailClientType
Content Model: (#PCDATA)
Attributes: None
Usage: This gives the e-mail client type of the client device. The content may be one of the following: "SMTP", "POP3", "IMAP4" or "*X-mail application name*". The client software should not render the mail protocol names as such to the user. Instead the client software should understand the user device email environment and interpret these names in the scope of this email environment. The information presented to the user should be also meaningful to the user.
- 10
- 15
- 20
- D.7.5 VoiceCallCapability
Content Model: (#PCDATA)
Attributes: Class, ID, Cacheability, ValidityPeriod
Usage: This gives the dynamic voice call capabilities of the client device. The content is one of the following: "NONE", "VOICE_CALL", "RICH_VOICE_CALL".
- 25
- D.7.6 MultimediaCallCapabilities
Content Model: (MMCap*)
Attributes: Class, ID, Cacheability, ValidityPeriod
Usage: This gives the dynamic one-way and two-way multimedia communication capabilities of the user. An empty list indicates that no capabilities currently exist.
- 30
- 35 D.7.7 MMCap
Content Model: (#PCDATA)

Attributes: None

Usage: This gives the multimedia call capability type. It may be one of the following: "UPLINK_VIDEO_STREAMING", "DOWNLINK_VIDEO_STREAMING", "VIDEO_CALL", "RICH_VIDEO_CALL".

5

D.8 User Attributes

This class contains both user defined and client specific presence data.

10

D.8.1 UserPresenceItem

Content Model: (#PCDATA)

Attributes: Class, ID, Cacheability, ValidityPeriod, ExtRef, ExtRef-

Change

15

Usage: This gives a means for the user to defined their own presence items. If more than one user specified presence item is defined for the same role then the use of ID attribute is mandatory. The content may be a short text. The optional attribute ExtRef is a URL of an external object referenced by this presence item. The URL may refer to another part of the multipart MIME that carries the XML-document of the presence item or it may be a reference to an external object. The optioanal attribute ExtRefChange may be used to indicate the subscribers that the external object has changed.

20

25

D.8.2 ClientTypeRequest

Content Model: (EMPTY)

Attributes: Class, ID, Cacheability, ValidityPeriod

30

Usage: This is a special element used by the publisher to request the client types of his subscribers. When a publisher includes this element into his presence data for a given role then the server sends this to all the subscribers of the presence information with the PushPresence message. Optionally it may also be

35

included in the PresenceItems message used by non-subscribers to request specific presence items. This element is not advertised in the PresenceInfo message. It is not a presence element that can be subscribed to. The presence server after having first time sent this item to the subscribers may periodically include this item also to further PushPresence messages to make sure that all the subscriber clients have this item.

The clients upon receiving this item send their client types to the presence server. In addition a client should send it's type to the server every time the client is activated when this item is the presence info stored in the client.

An alternative way of the publisher getting to know the client types of his subscribers would have been for the publisher to subscribe their client types. This however is a different business model. A publisher may not always want to be a subscriber of his own subscribers. This element allows the publisher to get the client types within the existing contractual frame between the publisher and the presence service provider. In addition this method mandates the subscriber client to send their types to the server. If the publisher would have used the subscription model to get the client types then the authorisation of this information to the publisher would have been at the discretion of the subscriber.

25 D.8.3 ClientType

Content Model: (ClientName, ClientManufacturer, ClientVersion)

Attributes: Class, ID, Cacheability, ValidityPeriod

Usage: Knowledge of the subscriber client types is used by publishers to enable client specific extensions to the presence set. It does not make sense for a publisher to use these extension items if his subscriber clients are not able to decode them.

A subscriber client sends the cliend type info to the presence server using the UpdatePresence message. The GroupID used in the message belongs to the publisher's role and not to the subsriber's own role. This is an exception from the general rule that a user is

allowed to update the presence information of his own role only. The presence server sends the information of this element to the publisher using the PushPresence message. The GroupID used belongs to the publisher role. From the publisher point of view then he is getting presence information from his own presence set.

A publisher may include his own client type into his presence set. Then this information is handled like any other presence information and does not imply any special behaviour in presence servers or subscriber clients.

10

D.8.4 ClientName

Content Model: (#PCDATA)

Attributes: None

Usage: This element gives the name of the presence client application

15

D.8.5 ClientManufacture

Content Model: (#PCDATA)

Attributes: None

Usage: This element gives the name of the presence client manufacture

20

D.8.6 ClientVersion

Content Model: (#PCDATA)

Attributes: None

Usage: This element gives the version of the client application.

25

D.8.7 ClientPresenceItem

Content Model: (ClientType, CliPresItem)

Attributes: Class, ID, Cacheability, ValidityPeriod, ContentChange

Usage: This element is the publisher client application specific presence item. The ClientType is the client type of the publisher's presence client. No attributes are used in the ClientType item when used as part of this element. If the publisher defines more than one client specific presence item then the use of the ID attribute is

30

35

5 mandatory. The optional attribute ContentChange is a
 counter from 0 to 255. When used it is increased by
 one every time the content of the presence item
 changes. This provides an alternative means for the
 presence server to detect change in the content of a
 non-standard presence item. The other alternative
 would have been for the presence server to assume
 that the content changes every time this item is sent to
 the server with the same ID attribute. The server
 10 behaves in this way when the ContentChange attribute
 is not used by the client. When two items with the same
 ID attribute have the same counter value in
 ContentChange then the content of these two items is
 the same.

15

D.8.8 CliPresItem

Content Model: (#PCDATA)

Attributes: None

Usage: This element is the client specific presence extension.
 20 It's syntax and structure is assumed to be known to the
 client but not to the network elements.

D.9 Extended Presence Service

The extended presence service class is meant to provide a service
 provider specific extension to the presence service. Like the client
 25 application specific extension only the service end points (i.e. the
 publisher and the subscriber clients) need to be able to decode the
 extensions. It is possible that the presence server also understands
 the extensions but this is not mandated by this document. The
 difference between the client specific extension method and this
 30 method is that the service provider controlled clients do not need to
 implement the standard presence items. It is assumed that the
 presence items are completely defined by the service provider and
 there is a means to update the user device hosted clients with new
 35 features. One possible update method is sw downloading via air. If a
 service provider creates new types of presence items then he needs

to update the existing clients to support these new types. The service provider controlled client communicates with the presence server directly and not via a standard presence client. A standard presence client ignores all elements of this class.

- 5 An extended presence service uses primarily the elements of this class. It is allowed to use also the standard presence element definitions. It uses the standard presence protocol.

D.9.1 ExtPresence

10 **Content Model:** (#PCDATA)

Attributes: Class, ID, Cacheability, ValidityPeriod, ContentChange

15 **Usage:** The use of ID attribute is mandatory if more than one presence item is defined by this mechanism. The optional ContentChange attribute is available also for this element. The syntax and representation of the contents are not in the scope of this document. The presence servers and proxies should allow the contents to refer to objects carried in the same multipart MIME as the XML-documents containing this element.

20

D.10 DTD for the presence content format

<!-- Root element -->

25

<!ELEMENT Presence (DeviceOn | DeviceRoaming | NetworkType | UserStatus | PreferredContact | PreferredDefaults | LocalTime | MeasuredLocation | ConvertedLocation | StatedLocation | UserEnvironment | StatusText | StatusImage | StatusSound | MessagingCapabilities | EmailClient | VoiceCallCapability | MultimediaCallCapabilities | UserPresenceItem | ClientTypeRequest
30 | ClientType | ClientPresenceItem | ExtPresence) >

<!ATTLIST Presence Version NMTOKENS #REQUIRED >

<!ELEMENT DeviceOn (#PCDATA) >

35

<!ATTLIST DeviceOn

60

5 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
 DeviceName NMTOKEN #IMPLIED >

<!ELEMENT DeviceRoaming (#PCDATA) >

10 <!ATTLIST DeviceRoaming
 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
 DeviceName NMTOKEN #IMPLIED >

15

<!ELEMENT NetworkType (#PCDATA) >

<!ATTLIST NetworkType

20 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
 DeviceName NMTOKEN #IMPLIED >

25

<!ELEMENT UserStatus (#PCDATA) >

<!ATTLIST UserStatus

30 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED >

35

<!ELEMENT PreferredContact (#PCDATA) >

<!ATTLIST PreferredContact

5

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT PreferredDefaults ((TimePeriod, PrefCont)*) >

10

<!ATTLIST PreferredDefaults

15

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT TimePeriod (PeriodStart, PeriodEnd,
RepetitionPeriod?, PeriodPrecedence) >

20

<!ELEMENT PeriodStart (#PCDATA) >

<!ELEMENT PeriodEnd (#PCDATA) >

25

<!ELEMENT RepetitionPeriod (#PCDATA) >

<!ELEMENT PeriodPrecedence (#PCDATA) >

<!ELEMENT PrefCont (#PCDATA) >

30

<!ELEMENT LocalTime (#PCDATA) >

<!ATTLIST LocalTime

35

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED

62

ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT MeasuredLocation (#PCDATA) >

5 <!ATTLIST MeasuredLocation

10 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
Accuracy NMTOKEN #IMPLIED >

<!ELEMENT ConvertedLocation (#PCDATA) >

15 <!ATTLIST ConvertedLocation

20 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT StatedLocation (#PCDATA) >

25 <!ATTLIST StatedLocation

30 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT UserEnvironment (EnvAttributes+) >

<!ATTLIST UserEnvironment

35 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED

63

Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT EnvAttributes (#PCDATA) >

5

<!ELEMENT StatusText (#PCDATA) >

<!ATTLIST StatusText

10

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

15

<!ELEMENT StatusImage (#CDATA) >

<!ATTLIST StatusImage

20

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
ImageType NMTOKEN #IMPLIED >

25

<!ELEMENT StatusSound (#CDATA) >

<!ATTLIST StatusSound

30

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
SoundType NMTOKEN #IMPLIED >

35

<!ELEMENT MessagingCapabilities (MessType*) >

<!ATTLIST MessagingCapabilities

5 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT MessType (#PCDATA) >

10 <!ELEMENT EmailClient (EmailClientType*) >

<!ATTLIST EmailClientType

15 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED >

20 <!ELEMENT EmailClientType (#PCDATA) >

<!ELEMENT VoiceCallCapability (#PCDATA) >

<!ATTLIST VoiceCallCapability

25 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED >

30 <!ELEMENT MultimediaCallCapabilities (MMCap*) >

<!ATTLIST MultimediaCallCapabilities

35 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED

65

ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT MMCap (#PCDATA) >

5 <!ELEMENT UserPresenceltem (#PCDATA) >

<!ATTLIST UserPresenceltem

10 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
ExtRef PUBIDLITERAL #IMPLIED
ExtRefChange NMTOKEN #IMPLIED >

15 <!ELEMENT ClientTypeRequest (EMPTY) >

<!ATTLIST ClientTypeRequest

20 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

25 <!ELEMENT ClientType (ClientName, ClientManufacturer, ClientVer-
sion) >

<!ATTLIST ClientType

30 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

35 <!ELEMENT ClientName (#PCDATA) >

<!ELEMENT ClientManufacture (#PCDATA) >

<!ELEMENT ClientVersion (#PCDATA) >

5 <!ELEMENT ClientPresenceltem (ClientType, CliPresltem) >

<!ATTLIST ClientPresenceltem

10 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
 ContentChange NMTOKEN #IMPLIED >

15 <!ELEMENT CliPresltem (#PCDATA) >

<!ELEMENT ExtPresence (#PCDATA) >

<!ATTLIST ExtPresence

20 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
 25 ContentChange NMTOKEN #IMPLIED >

<!-- End of DTD -->

D.11 DTD for PresenceNames

30

The DTD for PresenceNames is the same as for Presence except that only the presence item names and attributes are included. No presence values are used.

35 <!-- Root element -->

<!ELEMENT PresenceNames (DeviceOn | DeviceRoaming | NetworkType | UserStatus | PreferredContact | PreferredDefaults | LocalTime | MeasuredLocation | ConvertedLocation | StatedLocation | UserEnvironment | StatusText | StatusImage | StatusSound | MessagingCapabilities | EmailClient |
5 VoiceCallCapability | MultimediaCallCapabilities | UserPresenceItem | ClientTypeRequest | ClientType | ClientPresenceItem | ExtPresence) >

<!ATTLIST PresenceNames Version NMTOKENS #REQUIRED >

10 <!ELEMENT DeviceOn (EMPTY) >

<!ATTLIST DeviceOn

15 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
DeviceName NMTOKEN #IMPLIED >

20 <!ELEMENT DeviceRoaming (EMPTY) >

<!ATTLIST DeviceRoaming

25 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
DeviceName NMTOKEN #IMPLIED >

30 <!ELEMENT NetworkType (EMPTY) >

<!ATTLIST NetworkType

35 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED

68

DeviceName NMTOKEN #IMPLIED >

<!ELEMENT UserStatus (EMPTY) >

5 <!ATTLIST UserStatus

Class NMTOKEN #IMPLIED

ID PUBIDLITERAL #IMPLIED

Cacheability NMTOKEN #IMPLIED

10 ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT PreferredContact (EMPTY) >

<!ATTLIST PreferredContact

15

Class NMTOKEN #IMPLIED

ID PUBIDLITERAL #IMPLIED

Cacheability NMTOKEN #IMPLIED

ValidityPeriod NMTOKEN #IMPLIED >

20

<!ELEMENT PreferredDefaults (EMPTY) >

<!ATTLIST PreferredDefaults

25

Class NMTOKEN #IMPLIED

ID PUBIDLITERAL #IMPLIED

Cacheability NMTOKEN #IMPLIED

ValidityPeriod NMTOKEN #IMPLIED >

30

<!ELEMENT LocalTime (EMPTY) >

<!ATTLIST LocalTime

35

Class NMTOKEN #IMPLIED

ID PUBIDLITERAL #IMPLIED

Cacheability NMTOKEN #IMPLIED

69

ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT MeasuredLocation (EMPTY) >

5 <!ATTLIST MeasuredLocation

10 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
Accuracy NMTOKEN #IMPLIED >

<!ELEMENT ConvertedLocation (EMPTY) >

15 <!ATTLIST ConvertedLocation

20 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT StatedLocation (EMPTY) >

25 <!ATTLIST StatedLocation

30 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT UserEnvironment (EMPTY) >

<!ATTLIST UserEnvironment

35 Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED

70

Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT StatusText (EMPTY) >

5

<!ATTLIST StatusText

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >

10

<!ELEMENT StatusImage (EMPTY) >

15

<!ATTLIST StatusImage

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
ImageType NMTOKEN #IMPLIED >

20

<!ELEMENT StatusSound (EMPTY) >

25

<!ATTLIST StatusSound

Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED
SoundType NMTOKEN #IMPLIED >

30

<!ELEMENT MessagingCapabilities (EMPTY) >

35

<!ATTLIST MessagingCapabilities

```
Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >
```

5

<!ELEMENT EmailClient (EMPTY) >

<!ATTLIST EmailClientType

10

```
Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >
```

15

<!ELEMENT VoiceCallCapability (EMPTY) >

<!ATTLIST VoiceCallCapability

20

```
Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >
```

25

<!ELEMENT MultimediaCallCapabilities (EMPTY) >

<!ATTLIST MultimediaCallCapabilities

30

```
Class NMTOKEN #IMPLIED
ID PUBIDLITERAL #IMPLIED
Cacheability NMTOKEN #IMPLIED
ValidityPeriod NMTOKEN #IMPLIED >
```

```
<!ELEMENT UserPresenceItem (EMPTY) >
```

35

<!ATTLIST UserPresenceItem

72

5 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
 ExtRef PUBIDLITERAL #IMPLIED
 ExtRefChange NMTOKEN #IMPLIED >

<!ELEMENT ClientType (EMPTY) >

10 <!ATTLIST ClientType

 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
15 ValidityPeriod NMTOKEN #IMPLIED >

<!ELEMENT ClientPresenceItem (EMPTY) >

20 <!ATTLIST ClientPresenceItem

 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
25 ContentChange NMTOKEN #IMPLIED >

<!ELEMENT ExtPresence (EMPTY) >

30 <!ATTLIST ExtPresence

 Class NMTOKEN #IMPLIED
 ID PUBIDLITERAL #IMPLIED
 Cacheability NMTOKEN #IMPLIED
 ValidityPeriod NMTOKEN #IMPLIED
35 ContentChange NMTOKEN #IMPLIED >

<!-- End of DTD -->

- It will be evident to those skilled in the art that as technology advances, the inventive concept can be implemented in many different ways.
- 5 Therefore the invention and its embodiments are not limited to the above examples but may vary within the scope and spirit of the appended claims.

What is claimed is:

1. A mobile messaging system comprising at least one client device and a server, wherein the client device comprises means for transmitting presence information as presence attributes to the server and means for receiving presence attributes from the server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, and the server comprises means for maintaining presence information based on the received presence attributes, wherein the client device comprises means for adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and the client device comprising means for processing a received presence attribute according to the qualifier parameters in said received attribute.
2. A system according to claim 1, wherein the client device comprises means for specifying in the qualifier presentation settings of the attribute, and the client device comprises means for presenting the received attribute on the basis of the qualifier.
3. A system according to claim 1, wherein the client device comprises means for specifying in said qualifier an application to which the attribute should be addressed, and the client device comprises means for addressing the received attribute to the application indicated by the qualifier.
4. A system according to any one of claims 1 to 3, wherein the server comprises means for determining on the basis of the qualifier whether to send the attribute to one or more client devices.
5. A mobile messaging system comprising at least one client device and a server, wherein the client device comprises means for transmitting presence information as presence attributes to the server and means for receiving presence attributes from the server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, wherein the server comprises means for maintaining presence information based on received presence attributes, wherein the client device comprises means for composing a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the

attribute and the qualifier specifying the use of the attribute, wherein the server further comprises means for searching for an already stored attribute containing the same identifiers as a received attribute and means for replacing said already stored attribute with said received attribute if the combination of identifiers of said received attribute is identical to that of said already stored attribute or otherwise adding said received attribute, and the client device further comprises means for searching for an already stored attribute containing same identifiers as a received attribute and means for replacing said already stored attribute with said received attribute if the combination of identifiers of said received attribute is identical to that of said already stored attribute or otherwise adding said received attribute.

6. A mobile messaging system according to any one of claims 1 to 5, wherein the presence attributes received from the client device by the server are stored in a database according to a publisher user in association with a presence group.
7. A mobile messaging system according to any one of claims 1 to 6, wherein each presence attribute is part of an item including an attribute name element and an attribute value.
8. A mobile messaging system according to claim 7, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.
9. A mobile messaging system according to any one of claims 1 to 8, wherein a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.
10. A mobile messaging system according to claim 9, wherein a user of said client device as a publisher is able to use said client device or more than one client device in more than one publisher role.
11. A mobile client device for mobile messaging system, said client device comprising means for transmitting presence information as presence attributes to a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, wherein said client device further

comprises means for adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

12. A mobile client device for mobile messaging system, said client device comprising means for receiving presence information from a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, wherein said client device further comprises means for adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and means for processing a received presence attribute according to the qualifier parameters in said received attribute.

13. A mobile client device for mobile messaging system, said client device comprising means for transmitting presence information as presence attributes to a server, and means for receiving presence attributes from the server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, wherein said client device further comprises means for composing a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the attribute and the qualifier specifying the use of the attribute, means for searching for an already stored attribute containing the same identifiers as a received attribute, and means for replacing said already stored attribute with said received attribute if the combination of identifiers of said received attribute is identical to that of said already stored attribute or otherwise adding said received attribute.

14. A mobile client device according to any one of the claims 11 to 13, wherein each presence attribute is part of an item including an attribute name element and an attribute value.

15. A mobile client device according to claim 14, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.

16. A mobile client device according to any one of the claims 11 to 15, wherein a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

17. A mobile client device according to claim 16, wherein a user of said mobile client device as a publisher is able to use said client device or more than one client device in more than one publisher role.

18. A server for a mobile messaging system, said server comprising means for maintaining presence information based on received presence attributes, said presence information being categorized by a plurality of presence attribute types identified by attribute name, means for receiving a presence attribute comprising a qualifier, the qualifier comprising one or more parameters specifying the use of the attribute, and means for processing a received presence attribute according to the qualifier parameters in said received attribute.

19. A server according to claim 18, wherein the presence attributes received from a client device by the server is stored in a database according to a publisher user in association with a presence group.

20. A server according to claim 18 or 19, wherein each presence attribute is part of an item including an attribute name element and an attribute value.

21. A server according to claim 20, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.

22. A server according to any one of the claims 18 to 21, wherein a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

23. A server according to claim 22, wherein a user of a client device in communication with said server acting as a publisher is able to use said client device or more than one client device in more than one publisher role.

24. An apparatus comprising means configured to transmit presence information as presence attributes to a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, and means configured to add a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

25. An apparatus comprising means configured to receive presence information from a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, means configured to add a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and means configured to process a received presence attribute according to the qualifier parameters in said received attribute.

26. An apparatus comprising means configured to transmit presence information as presence attributes to a server, means configured to receive presence information from the server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, means configured to compose a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the attribute and the qualifier specifying the use of the attribute, means configured to search for an already stored attribute containing the same identifiers as a received attribute, and means configured to replace said already stored attribute with said received attribute if the combination of identifiers of said received attribute is identical to that of said already stored attribute or otherwise adding said received attribute.

27. An apparatus according to any one of the claims 24 to 26, wherein each presence attribute is part of an item including an attribute name element and an attribute value.

28. An apparatus according to claim 27, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.

29. An apparatus according to any one of the claims 24 to 28, wherein a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

30. An apparatus according to claim 29, wherein a user of said mobile client device as a publisher is able to use said client device or more than one client device in more than one publisher role.

31. An apparatus comprising means configured to maintain presence information based on received presence attributes, said presence information being categorized by a plurality of presence attribute types identified by attribute name, means configured to receive a presence attribute comprising a qualifier, the qualifier comprising one or more parameters specifying the use of the attribute, and means configured to process a received presence attribute according to the qualifier parameters in said received attribute.

32. An apparatus according to claim 31, wherein the presence attributes received from a client device by the server is stored in a database according to a publisher user in association with a presence group.

33. An apparatus according to claim 31 or 32, wherein each presence attribute is part of an item including an attribute name element and an attribute value.

34. An apparatus according to claim 33, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.

35. An apparatus according to any one of the claims 31 to 34, wherein a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

36. An apparatus according to claim 35, wherein a user of a client device in communication with said server acting as a publisher is able to use said client device or more than one client device in more than one publisher role.

37. A method comprising transmitting presence information as presence attributes to a server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, and adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

38. A method comprising receiving presence information from a server, said presence information being categorized by a plurality of presence attribute types

identified by attribute name, adding a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute, and processing a received presence attribute according to the qualifier parameters in said received attribute.

39. A method comprising transmitting presence information as presence attributes to a server, receiving presence information from the server, said presence information being categorized by a plurality of presence attribute types identified by attribute name, composing a presence information attribute identified by a combination of an authorizer, an attribute name and a qualifier, the authorizer specifying the body responsible for maintaining the attribute and the qualifier specifying the use of the attribute, searching for an already stored attribute containing the same identifiers as a received attribute, and replacing said already stored attribute with said received attribute if the combination of identifiers of said received attribute is identical to that of said already stored attribute or otherwise adding said received attribute.

40. A method according to any one of the claims 37 to 39, wherein each presence attribute is part of an item including an attribute name element and an attribute value.

41. A method according to claim 40, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.

42. A method according to any one of the claims 37 to 41, wherein a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

43. A method according to claim 42, wherein a user of said mobile client device as a publisher is able to use said client device or more than one client device in more than one publisher role.

44. A method comprising maintaining presence information based on received presence attributes, said presence information being categorized by a plurality of presence attribute types identified by attribute name, receiving a presence attribute comprising a qualifier, the qualifier comprising one or more parameters specifying

the use of the attribute, and processing a received presence attribute according to the qualifier parameters in said received attribute.

45. A method according to claim 44, wherein the presence attributes received from a client device by the server is stored in a database according to a publisher user in association with a presence group.

46. A method according to claim 44 or 45, wherein each presence attribute is part of an item including an attribute name element and an attribute value.

47. A method according to claim 46, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.

48. A method according to any one of the claims 44 to 47, wherein a presence set comprises one or more presence attributes belonging to a single publisher role of a publisher user in association with a single presence group.

49. A method according to claim 48, wherein a user of a client device in communication with said server acting as a publisher is able to use said client device or more than one client device in more than one publisher role.

50. A computer-readable medium embodying a computer program for storage in a physical device, said computer program comprising computer program code for causing the physical device to transmit presence information as presence attributes, the presence information being categorized by a plurality of presence attributes identified by attribute name, and to add a qualifier to a presence attribute, the qualifier comprising one or more parameters specifying the use of the attribute.

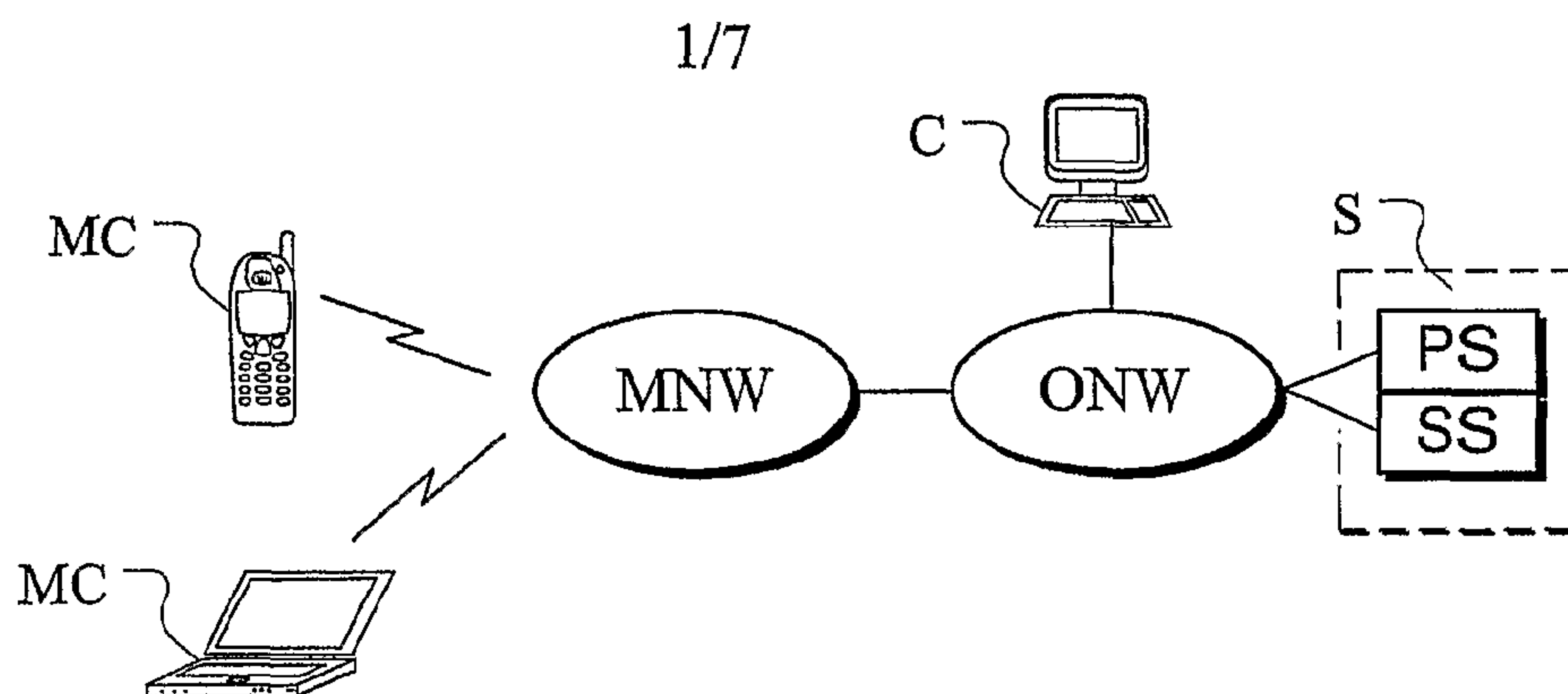
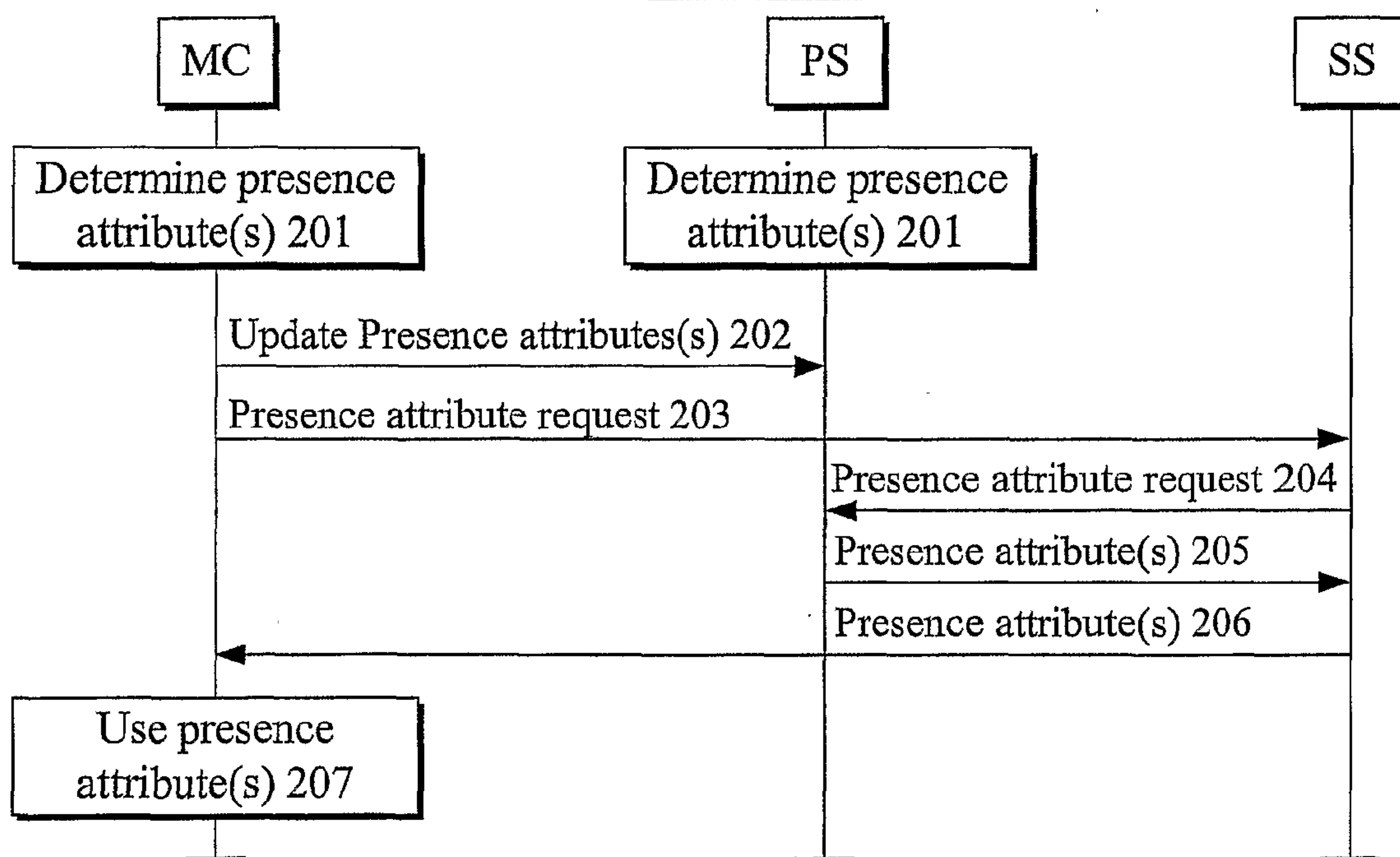
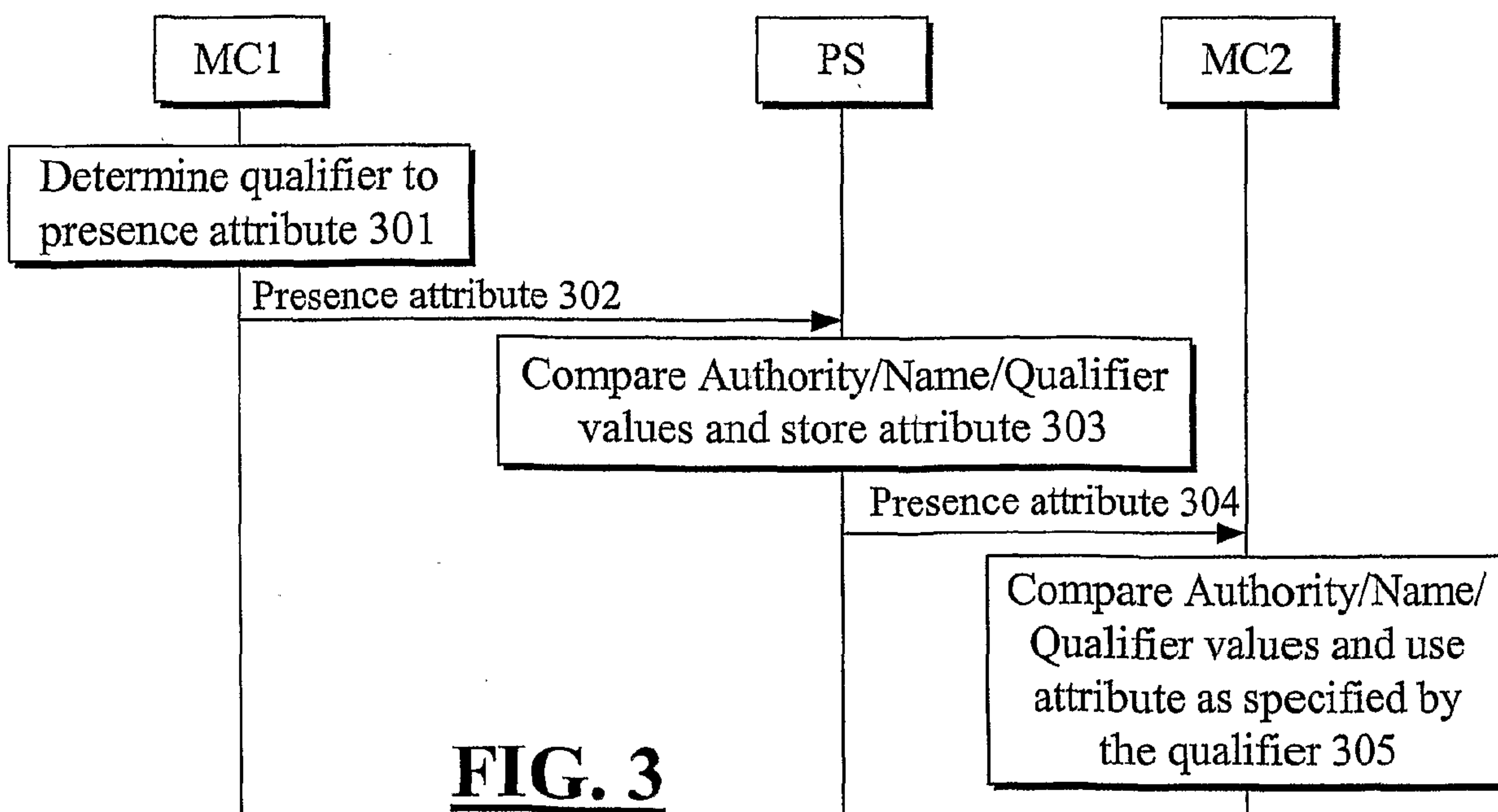
51. A computer-readable medium according to claim 50, wherein each presence attribute is part of an item including an attribute name element and an attribute value.

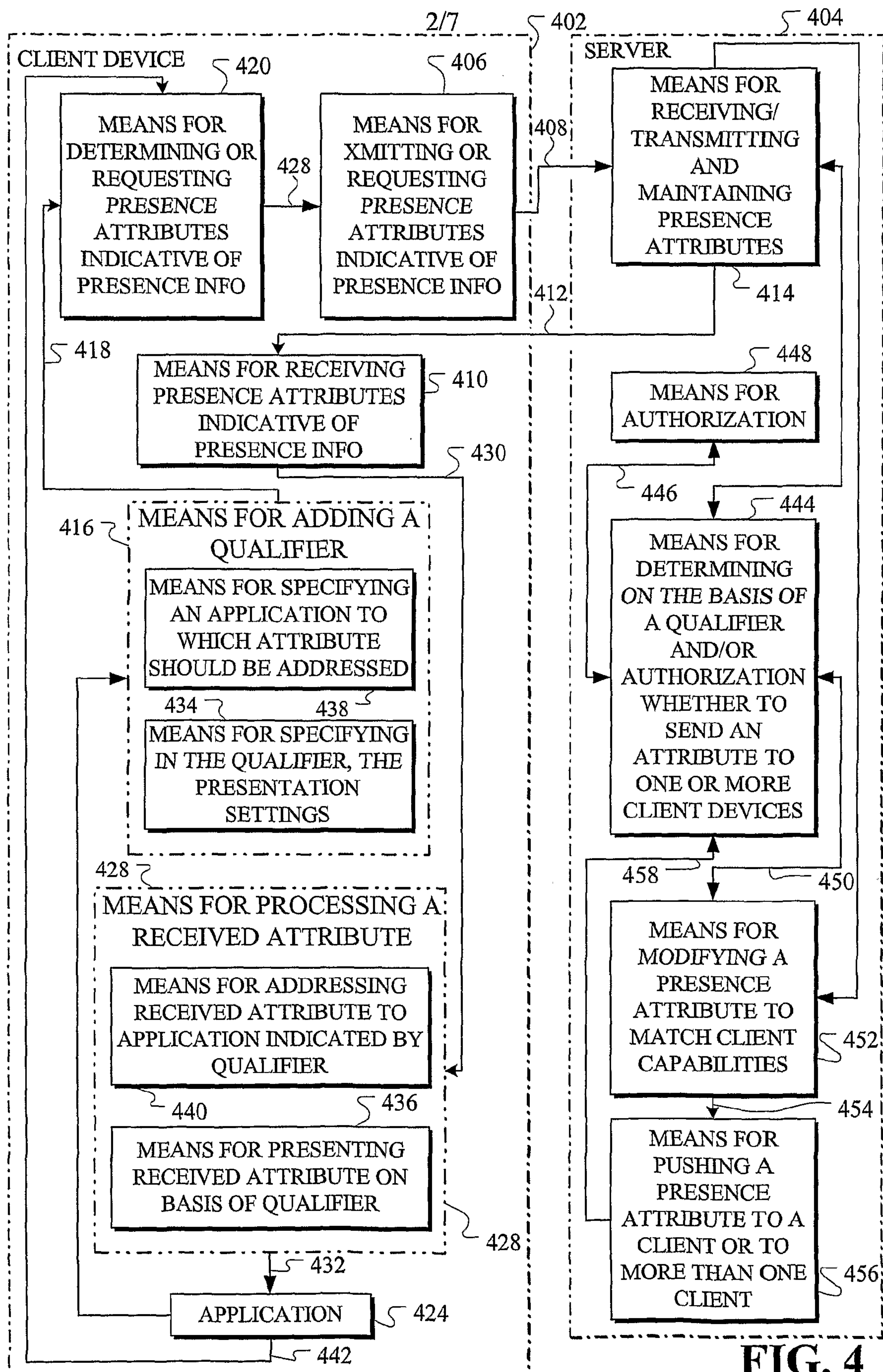
52. A computer-readable medium according to claim 51, wherein said name element includes an authority string indicative of an authority responsible for keeping said name element and attribute value unique.

53. A computer-readable medium according to any one of claims 50 to 52, wherein a presence set comprises one or more presence attributes belong to a single publisher role of a publisher user in association with a single presence group.

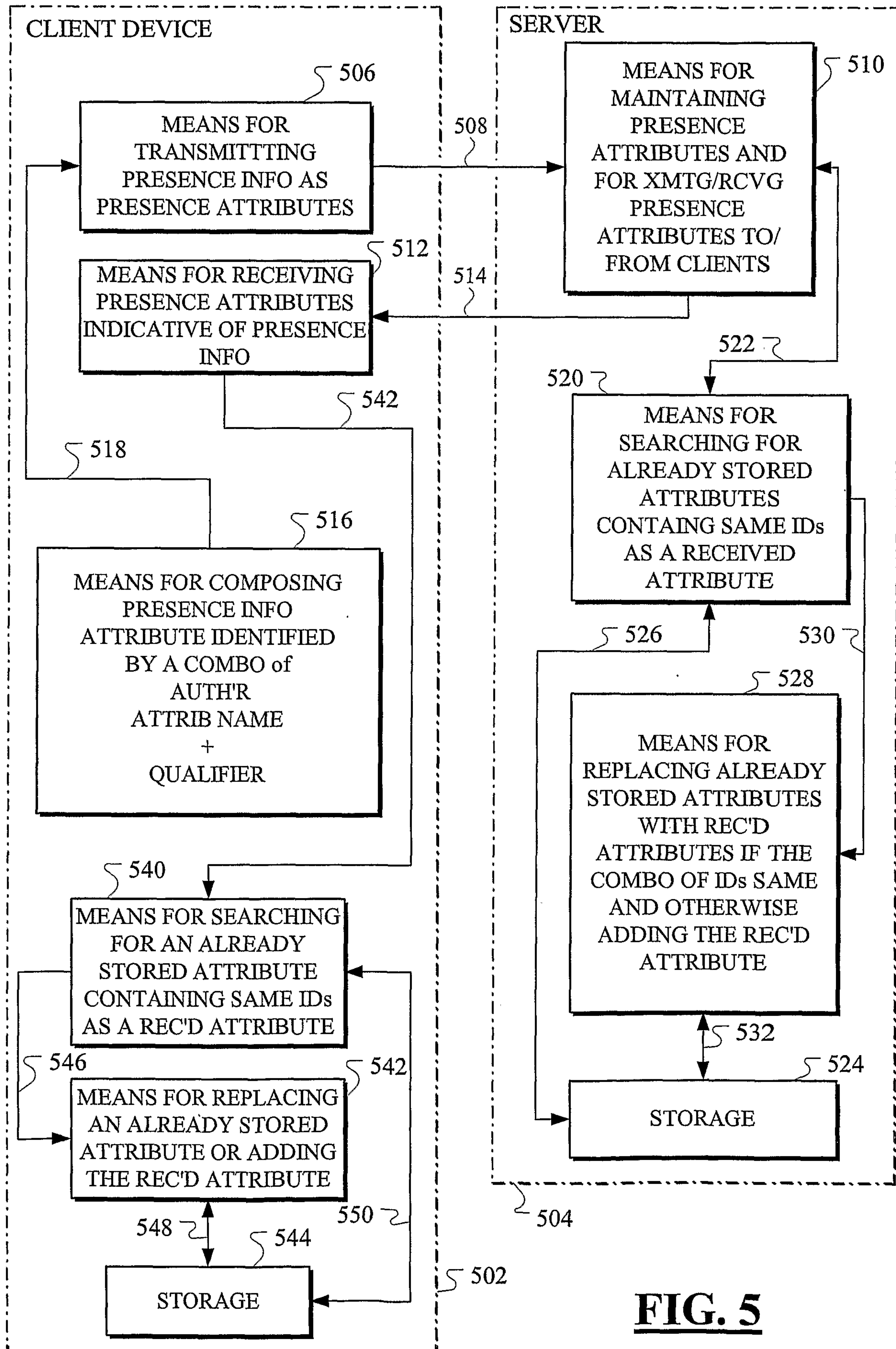
54. A computer-readable medium according to claim 53, wherein a user of said physical device as a publisher is able to use said physical device in more than one publisher role.

55. A physical device having a computer-readable medium stored therein according to any one of claims 50 to 54.

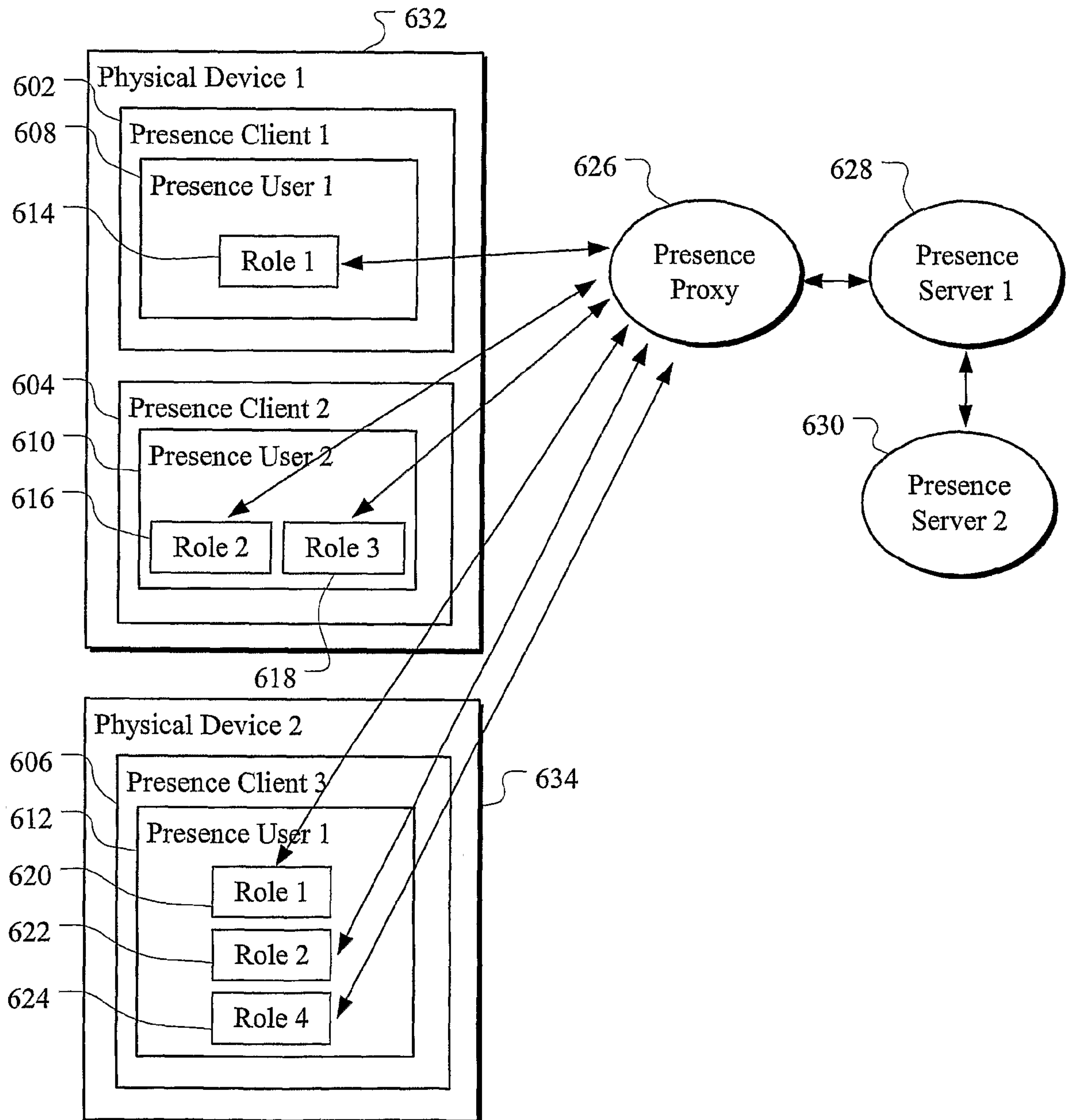
**FIG. 1****FIG. 2****FIG. 3**

**FIG. 4**

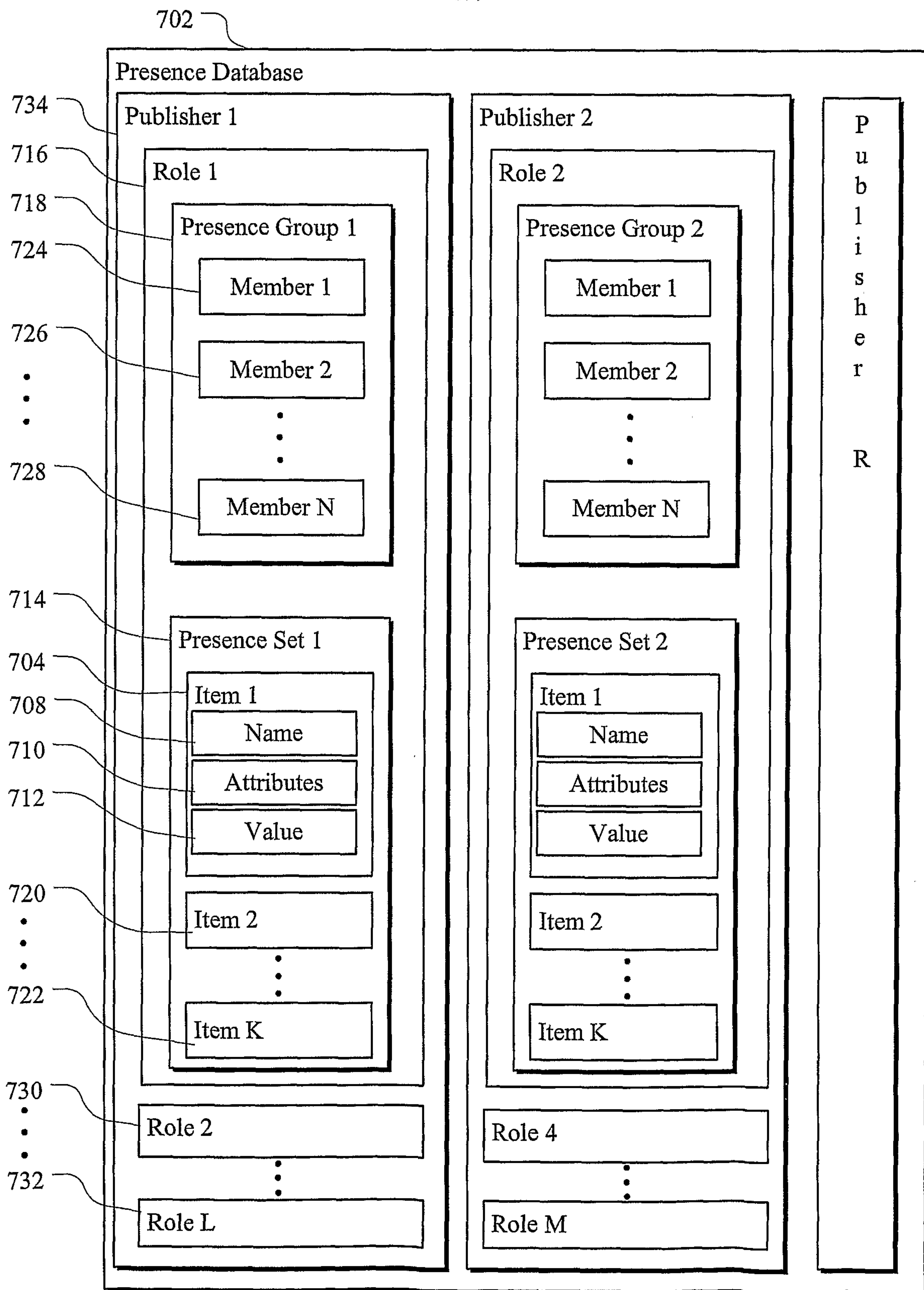
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**FIG. 5**

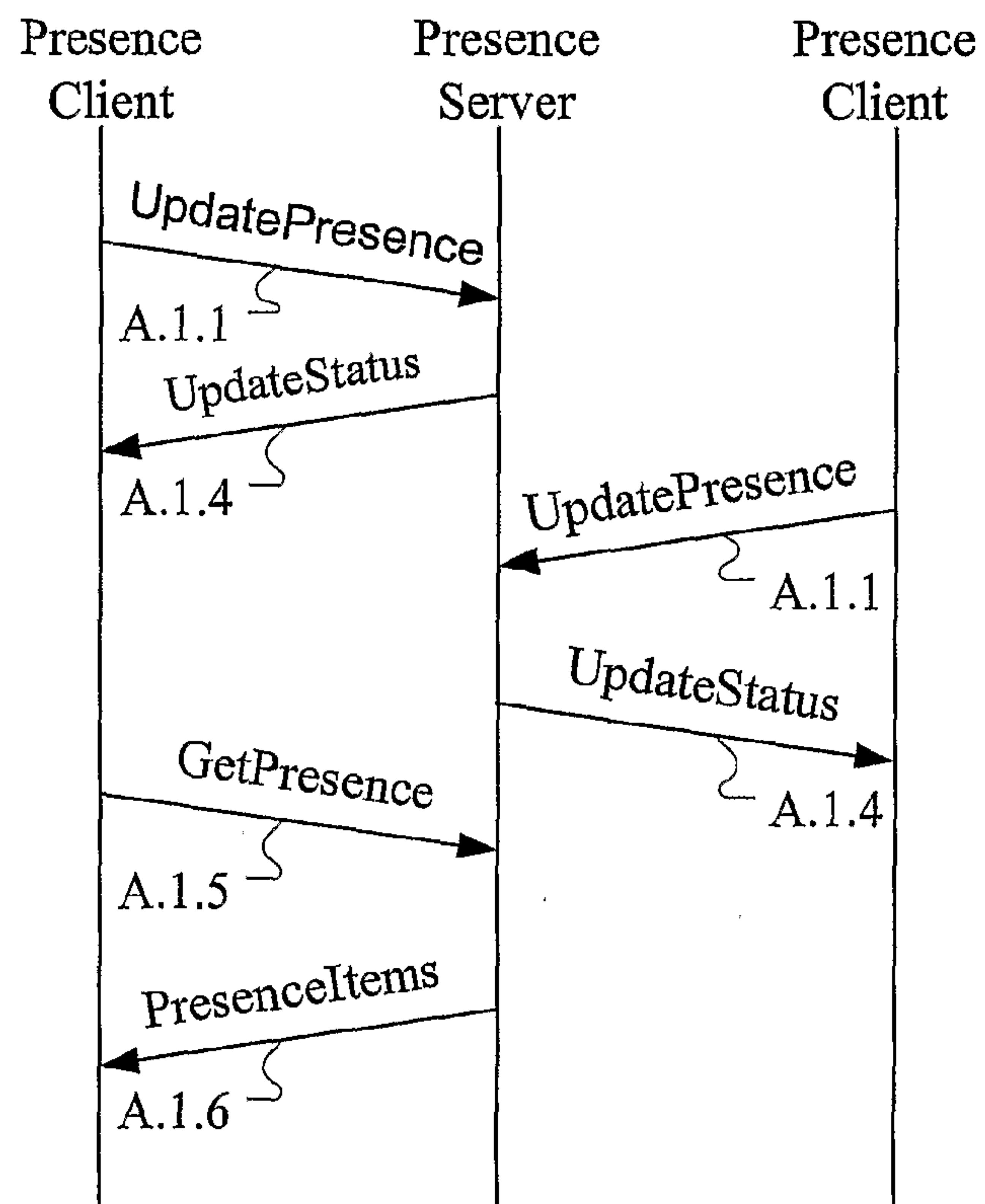
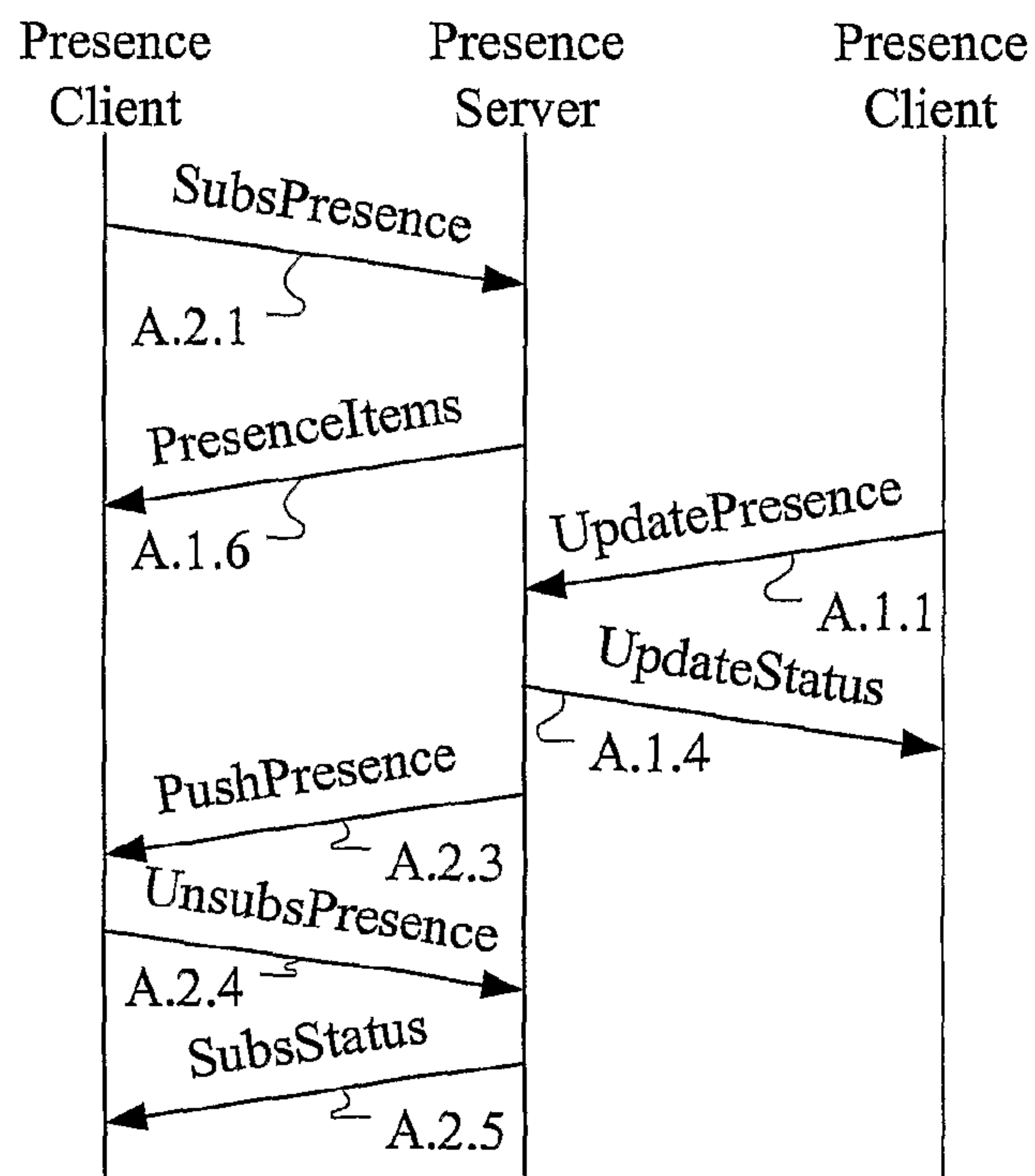
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**FIG. 6**

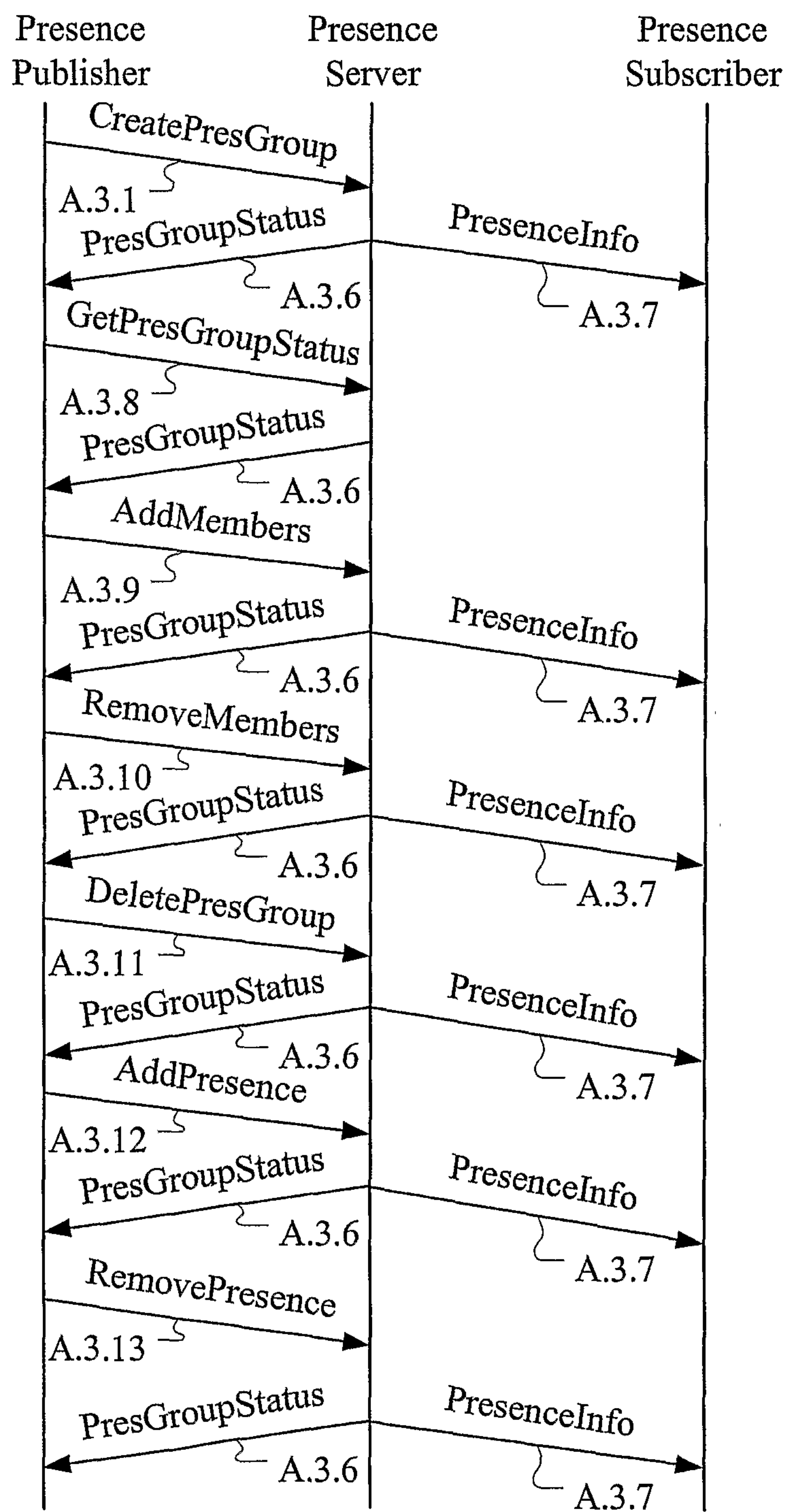
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**FIG. 7**

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**FIG. 8****FIG. 9**

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**FIG. 10**

