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(54) Title: **BACKUP-SAFE MULTI-DEVICE COMMUNICATION**

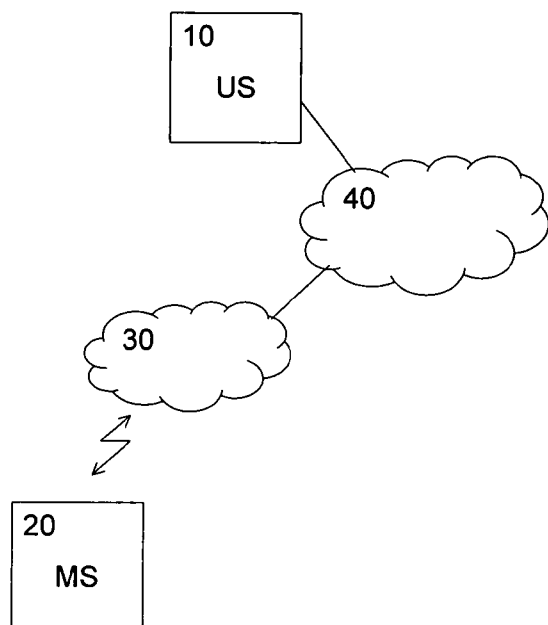


Fig. 1

(57) Abstract: The present invention relates to methods and apparatuses for providing backup functionality in a communication network, wherein a client functionality is provided at a terminal device (20), for synchronizing at least one of user data and metadata of the terminal device (20) with a unifying server (10) of the communication network. The unifying server (10) comprises network interface means for enabling synchronization of at least one of user data and metadata with at least one terminal device (20) of the communication network.

Backup-Safe Multi-Device Communication

FIELD OF THE INVENTION

5 The present invention relates to methods and apparatuses for providing backup functionalities for communication networks, such as – but not limited to – Universal Mobile Communications System (UMTS), Wireless Local Area Network (WLAN), or Long Term Evolution (LTE) networks.

BACKGROUND OF THE INVENTION

10 Mobile communications systems are typically very device-centric, which means that SMS (Short Message Service) messages, call details, phonebooks, presence etc. are often stored only in mobile terminals, such as mobile or cellular phones, laptops, personal digital assistants (PDAs) and the like. This may create problems especially when a user has multiple devices and/or loses or temporarily misplaces his/her cellular phone.

15 In situations with multiple devices like mobile handsets, laptops, personal computers (PCs) and WLAN handsets today, the user is forced to maintain e.g. multiple copies of an address book (e.g. one for Skype contacts, one for the phonebook, another contact list for Instant Messaging buddies etc), which are not synchronized with each other.

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If, on the other hand, a user's device is stolen or misplaced, invaluable information may be immediately and irretrievably lost. This is obviously unacceptable as the amount of important – even critical – information typically stored on handsets increases.

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Current solutions are focused on backup approaches where a phone's content is backed up on a PC or in a network using operators' backup functionalities. However, backups are typically taken only occasionally and all important data is not available when needed. Most of these solutions lack real-time access to the information, two-way synchronization and real-time transparent updates of the data and/or metadata (meta data, or sometimes metainformation) which designates "data about data" of any sort in any media. An item of metadata may describe an

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individual datum, or content item, or a collection of data including multiple content items and hierarchical levels, for example a database schema.

5 In an exemplary case, an end user using two phones could leave for a weekend with a smaller free-time phone and then find out that an important SMS message just received is stored only in the other phone. Or, that it is impossible to check the recently sent messages or if delivery of those has been successful.

10 Current solutions typically back up content by one technology-related silo or archive at a time. Thus, back up logic is separated for e.g. SMS, multimedia message service (MMS), photos, voice mail and instant messaging. With this approach, it is difficult to implement comprehensive backing up of all data. These backups could also have different last backup times.

15 SUMMARY

It is an object of the present invention to provide an improved backup functionality especially for distributed communications networks and environments.

20 This object is achieved on a terminal side by a method for providing backup functionality in a communication network, said method comprising providing at a terminal device a client functionality for synchronizing at least one of user data and metadata of said terminal device with a unifying server of said communication network.

25 Furthermore, the above object is achieved on a network side by a method for providing backup functionality in a communication network, said method comprising providing at a server device a network interface means for synchronizing at least one of user data and metadata with at least one terminal device (20) of said communication network.

30 Additionally, the above object is achieved on the terminal side by an apparatus for providing backup functionality in a communication network, said apparatus comprising a client functionality configured to synchronize at least one of user data and metadata of a terminal device with a unifying server of said communication network.

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Finally, the above object is achieved on the network side by an apparatus for providing backup functionality in a communication network, said apparatus comprising a network interface means configured to synchronize at least one of user data and metadata of a server device with at least one terminal device of said communication network.

Accordingly, all devices that are connected to the communication network system (there may be one or more terminal device of a particular user) can be kept in synchronization. Also, if a primary terminal device is permanently lost or destroyed, a new terminal device can be synchronized with the "old" data provided in the unifying server and the replacement device can be provided with the same "look and feel" and data as the old device immediately after initial synchronization.

It is therefore made possible for end-user to manage messages, logs, voice mails, presence information etc. from multiple devices. That means that for example deleting a message at a personal computer (PC) will delete the same message also from the mobile device of the same user. In practice, the unifying server can always be kept up to date. If a user is using multiple devices simultaneously, it can be ensured that latest changes are taken into account at all devices.

The proposed solution adds a further valuable option in that multi-device access to missed calls can be provided if the terminal device is switched on or active and backing up to the unifying server is running or activated. With this solution even a user who has left a phone at home can check e.g. by a web access who has tried to call him. Thus, SMS messages, missed calls etc. can be seen without returning to the terminal device.

The proposed synchronization may be based for example on at least one of synchronization markup language (SyncML), extensible messaging and presence protocol (XMPP), and session initiation protocol (SIP).

Furthermore, the synchronization of the at least one of user data and metadata of a user may be initiated in response to an activation of a client functionality of a new device of the user.

To provide a timing reference, time stamps may be added to the at least one of user data and metadata during synchronization. In a specific example, these time stamps may comprise at least one of arrival or departure dates and times of mes-

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sages. Thereby, it can be made sure that the actual time of receipt is considered without any synchronization delay.

5 The client functionality may provide access to different messaging systems and may collect data of different technologies.

10 More specifically, the client functionality may use conversation history functions of at least one instant messaging server to derive the at least one of user data and metadata.

The client functionality may forward incoming or outgoing information to the unifying server. Such incoming or outgoing information may comprise at least one of an incoming or outgoing message, a voice call log, a voice mail, a presence information, and the like.

15 Furthermore, the client functionality may manage access credentials to different services, to thereby add authentication functionality to the synchronization process.

20 In addition, the client functionality may transmit periodic updates of the at least one of user data and metadata to the unifying server at predetermined time periods. As an example, synchronization may be initiated immediately after a predetermined event or periodically at predetermined intervals (for example every 15 minutes or the like).

25 Moreover, the client functionality can be configured as a background application running on the terminal device.

30 The network interface means at the network side may comprises a web-based interface for exchanging data, and a programming interface for programmable access to data.

35 Additionally, the unifying server may distribute updates to connected devices of a user in response to an update of server-side information of the user. Moreover, it may control the terminal device to selectively delete the content of a predetermined device.

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Furthermore, the unifying server may provide access for multiple devices of a user to a call which was directed to the user.

5 The above method steps in relation to the client functionality and the network interface can be implemented as a software routine or computer program product which achieves the above and other functionalities when run on a computer device provided e.g. at the terminal device.

10 Additionally, the above apparatuses can be implemented as circuit arrangements, processor devices, chip devices, chip modules provided in network devices, e.g., terminal devices or server devices.

Other advantageous modifications are defined in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

15 The invention will now be described in greater detail based on embodiments with reference to the accompanying drawings in which:

Fig. 1 shows a schematic network architecture according to embodiments of the present invention;

20 Fig. 2 shows a schematic signaling diagram according to an implementation example of the embodiments;

Fig. 3 shows a schematic signaling diagram indicating an injection of a past item according to an embodiment;

Fig. 4 shows a schematic block diagram of a server device according to a first embodiment;

25 Fig. 5 shows a schematic block diagram of a mobile terminal device according to a second embodiment; and

Fig. 6 shows a schematic block diagram of software-based implementation according to a third embodiment.

DESCRIPTION OF THE EMBODIMENTS

In the following, embodiments of the present invention will be described based on exemplary and non-limiting network architecture with radio access.

Fig. 1 shows a schematic network architecture with a radio access network (RAN) 30 (e.g. a Universal Mobile Telecommunications System (UMTS) Terrestrial RAN (UTRAN), a WLAN or a Worldwide Interoperability for Microwave Access (WiMax) network) which provides wireless access to the Internet 40 or any other fixed network. A mobile station (MS) 20 is connected to the RAN 30 for communication, service access, data retrieval etc. Additionally, according to the embodiments, a unifying server (US) 10 is provided in or connected to the Internet 40 as a server-side component residing in the Internet (and possibly operated by the operator or a global service provider) which collates or gathers all information coming from mobile device(s) (such as the mobile station 20). To achieve this, the unifying server 10 may comprise a web-based interface for providing access to its data and an application programming interface (API) for secure, programmable access to its data.

In addition, the mobile station 20 or any other terminal device or network device comprises a client side functionality to enable data synchronization with the unifying server 10. The client functionality can have access to different messaging systems and can collect user data or metadata from different technology silos or applications. As an example, the user data or metadata may be obtained from an existing and scalable place for archiving communication, such as conversation history functions of instant messaging servers.

The server-side component, e.g. the unifying server 10, can be operated on a global level or locally/regionally by an operator. It acts as a "mirror image" of individual terminal or network devices (e.g. phones). It is thus more than just a backup server, as it allows complete access to the user's information via other devices and provides a standard web-based interface to all services and information of individual users' devices. It can receive periodic updates related to the users' data or metadata from the respective user device (e.g. phone) and/or network elements in the operator network. In addition to the users primary device, the server-side information can be updated from the users' other devices, the operator network or via the web-interface. All updates are propagated to all the connected devices on the next update.

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Fig. 2 shows a schematic signaling diagram according to an implementation example of various embodiments. Here, a first device (A) 60 (e.g. a mobile phone) receives in step 1 an SMS or MMS. In response thereto, all received messages are forwarded to the unifying server 10 (step 2). Later, the first device 60 receives or makes calls (step 3). Again, the unifying server 10 is responsively informed about the calls by forwarding information on all calls to the unifying server 10, where the information is stored (step 4). At predetermined or varying intervals, calendar and/or other data (e.g. contacts, memos, phonebook, etc.) is synchronized between the first device 60 and the unifying server 10 (step 5).

10 In case the first device 60 is lost or stolen (step 6), a new replacing or alternative second device (B) 70 (e.g. a PC or other (mobile) terminal) can access the unifying server 10 in step 7 directly or via a web browser or other network interface or application to retrieve the synchronized data and/or metadata of the lost or stolen first device 60.

15 Fig. 3 shows a schematic signaling diagram indicating an injection of a past item (e.g. a past call). On the left side of Fig. 3 a timeline (clock) is shown. Information exchange required for the synchronization process can be provided by modifying a used messaging protocol to facilitate the injection of the past items into a "discussion". In the example of Fig. 3, an instant messaging (IM) part represents a protocol like XMPP or SIP, where messages between terminals A and B (e.g. mobile phones or the like) are forwarded to the unifying server (US). On the right side of Fig. 3 phone calls between the terminals A and B are shown, separate from the unifying server. On the terminals A and B a client functionality (e.g. software module or processing element) is provided that takes care of the IM communication as well as recognizes calls made with the respective terminal. The client functionality or mobile client may for example "reverse" all incoming messages (SMS and MMS), voice call logs, voice mail messages, presence information and communication to the unifying server-side component.

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30 In the present example, the client functionality may use an IM protocol extension to inject a past event like a call (or SMS etc.) e.g. of terminal A into the IM stream with a timestamp of the real (past) event time.

35 Thereby, the unifying server gets to know the complete communication history of terminal A (with timestamps for ordering) also outside IM protocol. The boxes in

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the middle of fig. 3 represent a timed communication history, i.e., what the unifying server has stored at each point of time.

Similarly, a corresponding client functionality at terminal B could also insert the event into the IM protocol stored at the unifying server.

Fig. 4 shows a schematic block diagram of the unifying server 10 according to a first embodiment.

The unifying server 10 comprises a processor or processing circuit 16 which may be fixedly wired or software-controlled to manage signaling and storage for synchronizing data and/or metadata received from the network to which the unifying server is connected via a web browser interface (WBI) 12 and an API 14. The data and/or metadata to be synchronized is stored in a database or archive (A) 18 which may be provided in or at the unifying server 10 or alternatively as a separate network device.

Optionally, the unifying server may be configured to control a terminal or network device (e.g. phone) to be synchronized. That is, a client or client functionality at the controlled terminal or network device may be capable of receiving instructions from the unifying server 10 in addition to providing information to it.

Fig. 5 shows a schematic block diagram of a terminal device 20 according to a second embodiment.

The terminal device 20 comprises a processor or processing circuit 24 which may be fixedly wired or software-controlled to manage signaling and storage for synchronizing data and/or metadata provided in archives or memories 22-1 to 22-n for images, contacts, calendar data, call logs, bookmarks, and the like. In the present example shown in Fig. 5, the terminal device 20 is a wireless terminal, where signaling information and synchronization data and/or metadata is transmitted to the network by a transceiver circuit (TRX) 26 via an antenna. The processing circuit is controllable by a client or client functionality (PCL) 28 which may be implemented as a software application or a wired circuit and which may be provided as an integral part of the processing circuit 24. It serves to transmit relevant data and metadata (e.g. images, contacts, calendar data, call logs, bookmarks etc.) to the unifying server 10 so that the unifying server 10 always maintains a consistent and up-to-date "mirror image" of the terminal or network device 20. The client functionality

28 may optionally be controllable by control information received via an API 27. In case of a remote control via the network, the API 27 may be connected to the transceiver circuit 26.

5 The client functionality 28 is configured to facilitate partial or full mirroring of the information stored in the memories 22-1 to 22-n to the unifying server 10 or other server device used for synchronization. The client functionality 28 can be a small background application running on the terminal or network device (e.g. phone) 20 with either one-way or two-way communication capabilities.

10 With one-way communication, the terminal or network device 20 is configured as the initiator of a connection to the unifying server and synchronization takes place when the terminal device 20 connects to the unifying server 10. Both unifying server 10 and client functionality 28 at the terminal or network device 20 know when their data or metadata have changed, so that there is no need to initiate frequent unnecessary synchronizations. Synchronization can be originated only from 15 the client side, e.g., when the client functionality 28 detects new data or when the user activates a device (client) that has not been updated for a time exceeding a configurable threshold period.

Alternatively or additionally, with two-way always-on communication, the unifying server 10 can initiate a connection to the terminal or network device 20 and control 20 the phone functionalities, e.g., via the respective APIs 14 and 27. It may be possible to use the synchronization system without always-on connections, thus conserving battery life.

25 With the above two-way communication, remote-controlling of the terminal or network device 20, e.g., via the respective APIs 14 and 27, is possible. This control option can be used to remotely wipe out the content from a lost or stolen device – keeping the data in the unifying server 10 and possible other clients but clearing the content from a particular device in the next synchronization or immediately on-demand.

30 The protocols to be used for synchronizing the information between the client (i.e. terminal or network device 20) and the server (i.e. unifying server 10) can be various. The messaging synchronization can be extended by, for example, using SyncML for calendar and data synchronization. For call logs, messages and presence, messaging oriented protocols can be used. Instead of the XMPP protocol,

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also other protocols such as SIP or proprietary protocols may be used. The client functionality 28 may be configured to back-date updates with the time and date of their arrival - i.e. an SMS that arrived at 10:23am should still be marked and sorted on the server-side as to have arrived at 10:23am, even if the synchronization event took place at e.g. 11:00am. This way the conversations stay coherent and consistent.

Through the use of client and device side APIs 27 and 14 messaging type data can be collected for storing the content from multiple servers into the single unifying network server 10. Thereby, a user "owns" all messaging or other data and thus has the option to decide on which kind of service to use. This holds for all clients and systems where APIs are provided for accessing data or metadata that exists on the device side. On the client side, access credentials, server addresses and possible user identities (IDs) to different services etc. can be managed. This kind of solution also allows showing familiar contact names used in the terminal or network device 20 on a web interface. Furthermore, this client-controlled setup can avoid unnecessary traffic (e.g. routing to or through a unifying server) about the messages etc. of any user who is not subscribed to this unifying server.

Fig. 6 shows a schematic block diagram of an alternative software-based implementation of the terminal or network device 20 or the unifying server 10 according to a third embodiment. The required functionalities can be implemented in any network entity 200 with a processing unit (PU) 210, which may be any processor or computer device with a control unit that performs control based on software routines of a control program stored in a memory 212. The control program may also be stored separately on a computer-readable medium. Program code instructions are fetched from the memory 212 and are loaded to the control unit of the processing unit 210 in order to perform the processing steps of the above device-specific functionalities described in connection with Figs. 4 and 5 and which may be implemented as the above mentioned software routines. The processing steps may be performed on the basis of input data DI and may generate output data DO. In case of the terminal or network device 20, the input data DI may newly detected or received data or metadata, and the output data DO may correspond to synchronization information to be forwarded to the unifying server 10. In case of the unifying server 10, the input data DI may correspond to received synchronization information, and the output data DO may correspond to the data or metadata to be stored for updating the archive 18.

Consequently, the above embodiments of the client and server functionalities may be implemented as a computer program product comprising code means for generating each individual step of the signaling or control procedures for the respective entity when run on a computer device or data processor of the respective entity at the terminal or network device 20 or the unifying server 10.

In summary, methods and apparatuses for providing backup functionality in a communication network have been described, wherein a client functionality is provided at a terminal device, for synchronizing at least one of user data and metadata of the terminal device with a unifying server of the communication network.

10 The unifying server comprises network interface means for enabling synchronization of at least one of user data and metadata with at least one terminal device (of the communication network).

It is apparent that the invention can easily be extended to any network environment and is not restricted to the mobile communication technology area and in particular not to mobile phones. The proposed embodiments can be implemented

15 in connection with any terminal device or network device in which user or client specific data is stored, so that an enhanced backup capability is provided in the concerned network. The embodiments may thus vary within the scope of the attached claims.

Claims

1. A method for providing backup functionality in a communication network, said method comprising providing at a terminal device (20) a client functionality (28) for synchronizing at least one of user data and metadata of said terminal device (20) with a unifying server (10) of said communication network.
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2. A method for providing backup functionality in a communication network, said method comprising providing at a server device (10) a network interface means (12, 14) for synchronizing at least one of user data and metadata with at least one terminal device (20) of said communication network.
10
3. The method according to claim 1 or 2, wherein said synchronization is based on at least one of synchronization markup language, extensible messaging and presence protocol, and session initiation protocol.
15
4. The method according to any one of the preceding claims, wherein said synchronization of said at least one of user data and metadata of a user is initiated in response to an activation of a client functionality of a new device of said user.
20
5. The method according to any one of the preceding claims, wherein time stamps are added to said at least one of user data and metadata during synchronization.
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6. The method according to claim 5, wherein said time stamps comprise at least one of arrival or departure dates and times of messages.
7. The method according to claim 1, wherein said client functionality (28) provides access to different messaging systems and collects data of different technologies.
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8. The method according to claim 1 or 7, wherein said client functionality (28) uses conversation history functions of at least one instant messaging server to derive said at least one of user data and metadata.
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9. The method according to any one of claims 1, 7 and 8, wherein said client functionality (28) forwards incoming or outgoing information to said unifying server (10).
- 5 10. The method according to claim 9, wherein said incoming or outgoing information comprises at least one of an incoming or outgoing message, a voice call log, a voice mail, and a presence information.
- 10 11. The method according to any one of claims 1 and 7 to 10, wherein said client functionality (28) manages access credentials to different services.
- 15 12. The method according to any one of claims 1 and 7 to 11, wherein said client functionality (28) transmits periodic updates of said at least one of user data and metadata to said unifying server (10) at predetermined time periods.
- 20 13. The method according to any one of claims 1 and 7 to 12, wherein said client functionality (28) is configured as a background application running on said terminal device (20).
14. The method according to claim 2, wherein said network interface means comprises a web-based interface (12) for exchanging data, and a programming interface (14) for programmable access to data.
- 25 15. The method according to claim 2 or 14, wherein said unifying server distributes updates to connected devices of a user in response to an update of server-side information of said user.
- 30 16. The method according to any one of claims 2, 14 and 15, wherein said unifying server (10) provides access for multiple devices of a user to a call which was directed to said user.
- 35 17. The method according to any one of claims 2, and 14 to 16, wherein said unifying server (10) controls said terminal device (20) to selectively delete the content of a predetermined device.
18. An apparatus for providing backup functionality in a communication network, said apparatus comprising a client functionality (28) configured to

synchronize at least one of user data and metadata of a terminal device (20) with a unifying server (10) of said communication network.

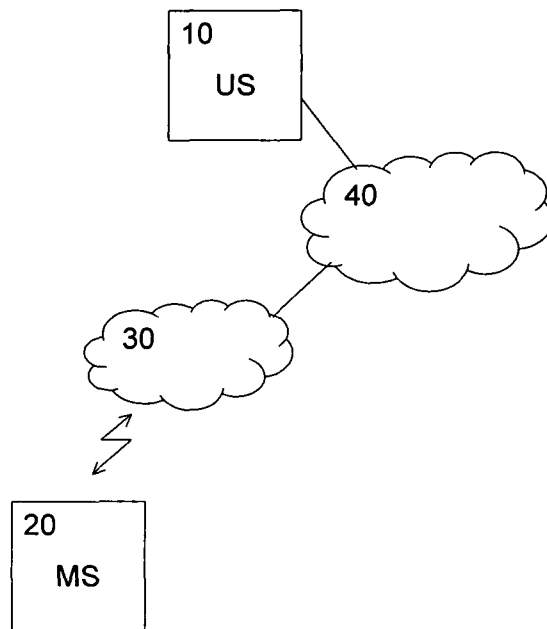
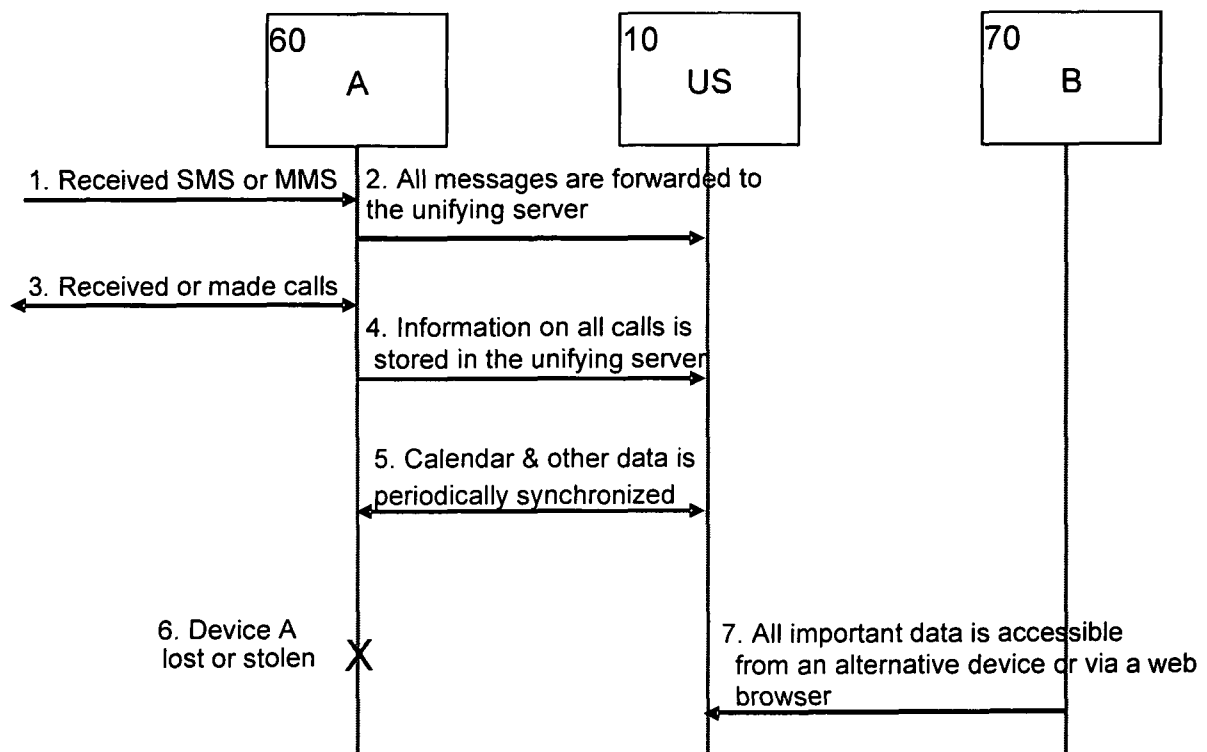
- 5 19. An apparatus for providing backup functionality in a communication network, said apparatus comprising a network interface means (12) configured to synchronize at least one of user data and metadata of a server device (10) with at least one terminal device (20) of said communication network.
- 10 20. The apparatus according to claim 18 or 19, wherein said synchronization is based on at least one of synchronization markup language, extensible messaging and presence protocol, and session initiation protocol.
- 15 21. The apparatus according to any one of claims 18 to 20, wherein said synchronization of said at least one of user data and metadata of a user is initiated in response to an activation of a client functionality of a new device of said user.
- 20 22. The apparatus according to any one of claims 18 to 21, wherein time stamps are added to said at least one of user data and metadata during synchronization.
23. The apparatus according to claim 22, wherein said time stamps comprise at least one of arrival or departure dates and times of messages.
- 25 24. The apparatus according to claim 18, wherein said client functionality (28) is configured to provide access to different messaging systems and to collect data of different technologies.
- 30 25. The apparatus according to claim 18 or 24, wherein said client functionality (28) is configured to use conversation history functions of at least one instant messaging server to derive said at least one of user data and metadata.
- 35 26. The apparatus according to any one of claims 18, 24 and 25, wherein said client functionality (28) is configured to forward incoming or outgoing information to said unifying server (10).

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27. The apparatus according to claim 26, wherein said incoming or outgoing information comprises at least one of an incoming or outgoing message, a voice call log, a voice mail, and a presence information.
- 5 28. The apparatus according to any one of claims 18 and 24 to 27, wherein said client functionality (28) is configured to manage access credentials to different services.
- 10 29. The apparatus according to any one of claims 18 and 24 to 28, wherein said client functionality (28) is configured to transmit periodic updates of said at least one of user data and metadata to said unifying server (10) at predetermined time periods.
- 15 30. The apparatus according to any one of claims 18 and 24 to 29, wherein said client functionality (28) is configured as a background application running on said terminal device (20).
- 20 31. The apparatus according to claim 19, wherein said network interface means comprises a web-based interface (12) configured to exchange data, and a programming interface (14) configured to provide programmable access to data.
- 25 32. The apparatus according to claim 19 or 31, wherein said unifying server (10) is configured to distribute updates to connected devices of a user in response to an update of server-side information of said user.
- 30 33. The apparatus according to any one of claims 19, 31 and 32, wherein said unifying server (10) is configured to provide access for multiple devices of a user to a call which was directed to said user.
- 35 34. The apparatus according to any one of claims 19, and 31 to 33, wherein said unifying server (10) is configured to control said terminal device (20) to selectively delete the content of a predetermined device.
- 35 35. A terminal device comprising an apparatus according to claim 18.
36. A server device comprising an apparatus according to claim 19.

37. A chip module comprising an apparatus according to claim 18 or 19.
38. A computer program product comprising code means for producing the steps of method claim 1 or 2 when run on a computer device.
- 5 39. A system comprising a terminal device according to claim 35 and a server device according to claim 36.

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**Fig. 1****Fig. 2**

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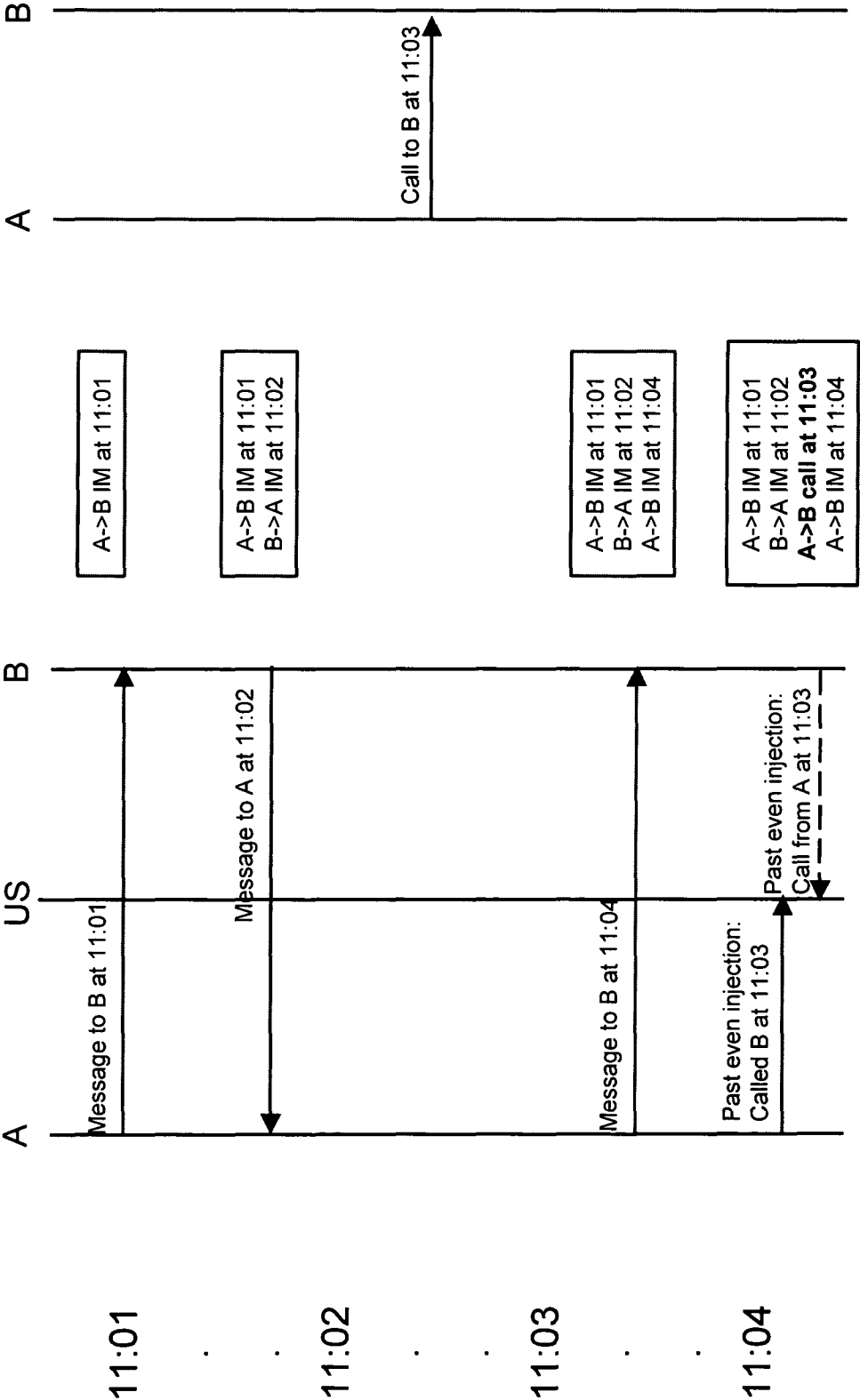
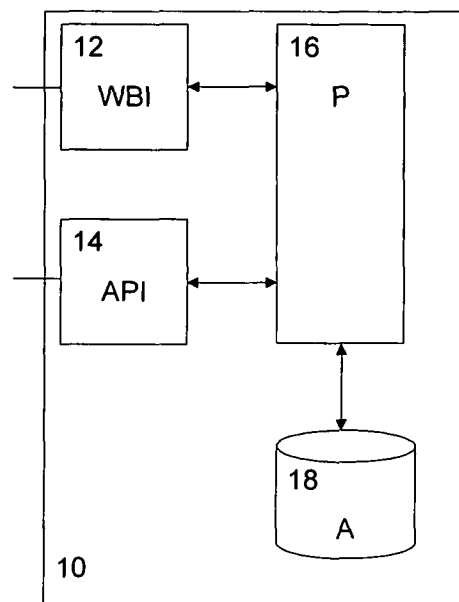
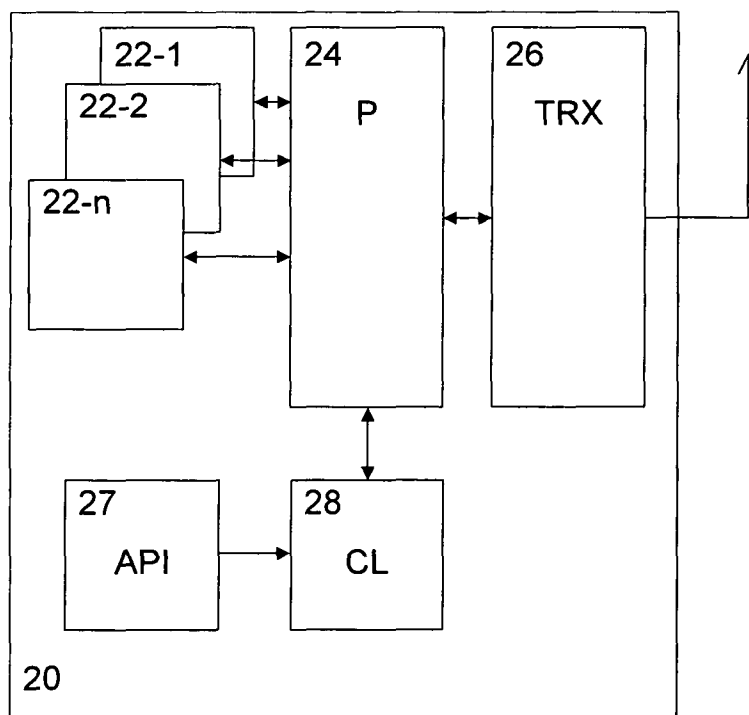
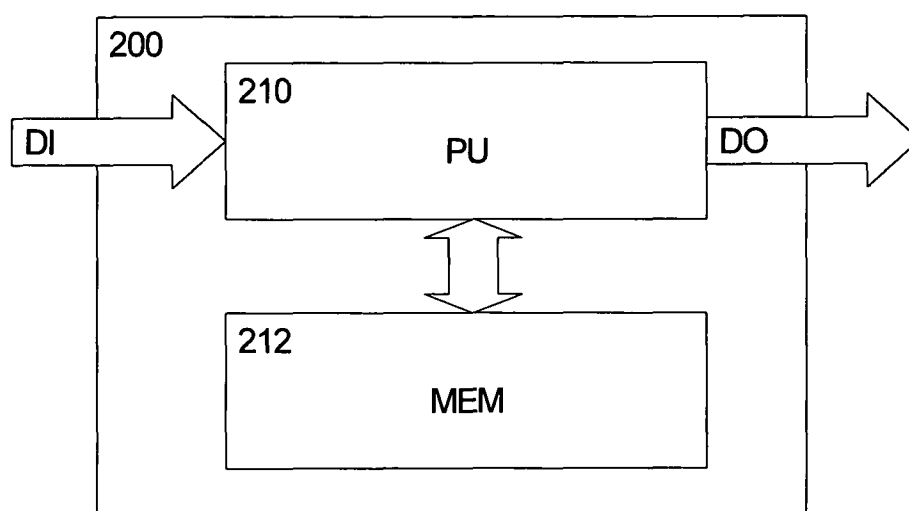


Fig. 3

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**Fig. 4****Fig. 5**

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**Fig. 6**

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/009949

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L29/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 942 423 A (APPLE INC [US]) 9 July 2008 (2008-07-09) abstract paragraph [0001] paragraph [0043] paragraph [0045] - paragraph [0050] paragraph [0055] - paragraph [0056] paragraph [0064] - paragraph [0066] paragraph [0076] paragraph [0105] - paragraph [0115] paragraph [0122] paragraph [0171] - paragraph [0180] figures 1a, 1b, 2, 4a-4c, 7c, 8b ----- -/--	1-39

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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X	EP 1 835 424 A (NOKIA CORP [FI]) 19 September 2007 (2007-09-19) paragraph [0034] - paragraph [0055] paragraph [0076] -----	1-39
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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WO 2007119968	A	25-10-2007	NONE	