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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
20 January 2005 (20.01.2005)

PCT

(10) International Publication Number
WO 2005/006650 A1

(51) International Patent Classification[7]: H04L 12/18, H04Q 7/28, 7/22

(21) International Application Number: PCT/EP2003/007469

(22) International Filing Date: 10 July 2003 (10.07.2003)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(national)*: 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, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, 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, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, 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,*

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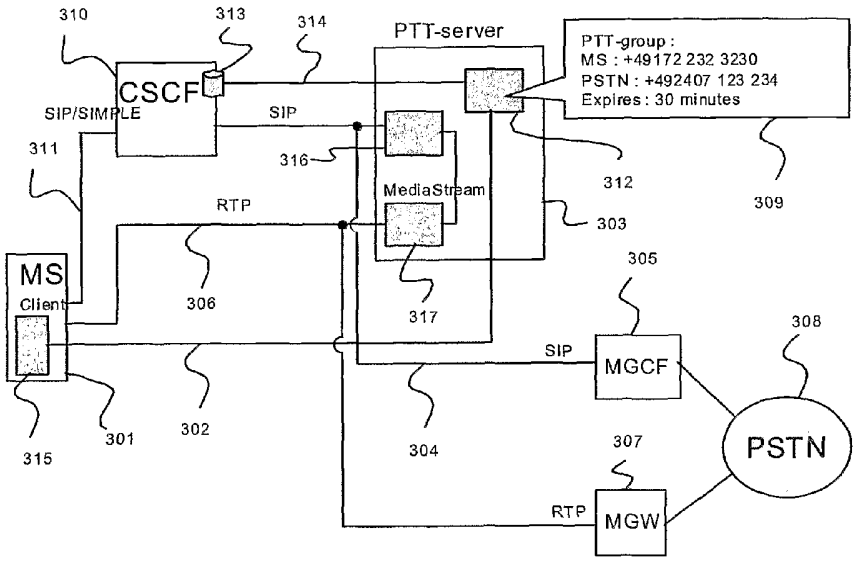
(54) Title: METHOD AND NODES FOR CONFERENCE COMMUNICATION



(57) Abstract: The invention relates to method for enabling a first terminal (CST) adapted to operate compliant to a circuit switched transmission protocol to participate in a conference session for distributing messages among a group of terminals (MS) adapted to operate compliant to a packet switched transmission protocol. A call set up message (1 l; 12; 13) is indicating a request for a participation of the first terminal in the conference session to a server (PTT) administrating the group. The server receives a request (102) for sending a message for the conference session. A circuit switched bearer (21) and a packet switched bearer (22; 50) are set up for transmitting the message. The message is sent buffered and converted from a payload format according to the packet switched transmission protocol to a payload format according to the circuit switched transmission protocol or vice versa. The converted message is sent and the packet switched bearer (50) is released.

WO 2005/006650 A1

MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, 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, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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.

METHOD AND NODES FOR CONFERENCE COMMUNICATION

Field of invention

The invention relates to a method and devices to enable a participating of a terminal operating compliant to a circuit switched transmission protocol in a conference session for distributing messages among a group of terminals operating compliant to a packet switched transmission protocol.

Description of prior art

For packet based telecommunication networks such as GPRS (General Packet Radio Service) networks and EDGE (Enhanced Data rates for GSM Evolution) networks, both packet based extensions of GSM (Global System for Mobile Communication) networks, IP (internet protocol) multimedia services have been developed providing communication using multimedia streams. One such IP multimedia service that has been developed for packet based networks provides communication within a group of users of packet switched terminals by exchanging voice messages. Said service is known as push-to talk service or as Ericsson Instant Talk. The group of users is administrated by a server that registers the users for a session. During a session a registered terminal can send a talk request followed by a voice message towards the server. The server takes part in establishing packet-based bearers to the different terminals, which participate in the session. The server buffers the voice message and sends the voice message via the established bearers towards the participating packet switched terminals. After the message has been send, an end of the voice message is detected and the packet-based bearers towards the participating terminals are released. The service enables the communication within a group for a long time and at the same time uses scarce radio resources efficiently. However the provision of the service is limited to users of packet-based terminals.

Summary of the invention

Therefore it is object of the invention to overcome the above shortcoming and to provide a method and devices enabling participating in a packet-based session for distributing messages to a larger user group.

This object is solved by the methods of claims 1 and 2, the core network node of claim 8, the server of claim 10, and the Media gateway of claim 15. Advantageous embodiments are described in the dependent claims.

A method according to the invention for enables a first terminal adapted to operate compliant to a circuit switched transmission protocol to participate in a conference session for distributing messages among a group of terminals adapted to operate compliant to a packet switched transmission protocol. The invented method comprises the steps of: registering a participation of the first terminal in the conference session by a server administrating the group, receiving a request for sending a message for the conference session, setting up a circuit switched bearer for transmitting the message, sending the message according to either the packet switched protocol or the circuit switched protocol, buffering the message, converting the message from a payload format according to the packet switched transmission protocol to a payload format according to the circuit switched transmission protocol or vice versa, and sending the converted message.

To indicate a request for the participation of the first terminal in the conference session a call setup message indicating the request can be routed towards the server.

A further method according to the invention enables a first terminal to participate in a conference session by a server. In that method the first terminal is adapted to operate compliant to a circuit switched transmission protocol, the conference session is used for distributing messages among a group of terminals adapted to operate compliant to a packet switched transmission protocol, and the server is administrating the group. The method comprises the following steps executed by the server: registering a participation of the first terminal in the conference session, receiving a request for sending a message

for the conference session, taking part in setting up a bearer for transmitting the message, receiving a message according the packet switched protocol, buffering the message, and sending the message.

To indicate a request for the participation of the first terminal in the conference session a call setup message indicating the request can be received by the server.

In an advantageous embodiment of the invention the server is adapted to initiate a releasing of the circuit switched bearer after a detecting of an end of the message. This has the advantage that network resources can be saved when no messages are sent by the first terminal at a certain time.

In a further advantageous embodiment the server is adapted to initiate a sending of silence frames via the circuit switched bearer after a detecting of an end of the message. By this the bearer can be kept and be ready for a fast transmission of a further request for sending a message from the terminal.

In a further advantageous embodiment the server is adapted to receive a request for sending a message, which is sent by the first terminal via the circuit switched bearer. This is advantageous, as existing messages can be used by the first terminal to indicate the talk request. Existing circuit switched terminals can therefore be used in the method.

In a further advantageous embodiment the request for sending a message is detected by the server using tone detection. This provides a fault tolerant and reliable method to indicate a talk request.

In a further advantageous embodiment the message is a voice message and the request for sending a message is detected by the server using voice detection or voice recognition. This provides the possibility to initiate the talk request via voice control to the user of the first terminal. This is a comfortable way of initiating the talk request.

In a further embodiment of the invention a core network node enables participating of a first terminal operating compliant to a circuit switched transmission protocol in a

conference session for distributing messages among a group of users of terminals operating compliant to a packet switched transmission protocol. The core network node comprises means for routing a call set up message indicating a request for a participation of the first terminal in the conference session towards a server administrating the group. The core network node comprises interfaces for sending and receiving messages and a processing system adapted to process a request for sending a message for the conference session and to forward the request towards the server administrating the group.

In an advantageous embodiment of the core network node the processing system is adapted to process a message indicating an end of a message for the conference session and to forward the indicating message towards the server administrating the group.

In a further embodiment of the invention a server is used for for administrating a group of terminals operating compliant to a packet switched transmission protocol. The server enables the group of terminals to exchange messages in a conference session. The server comprises an interface for receiving a request for sending a message for the conference session, signaling means for establishing and releasing a bearer for transmitting a message, interfaces for sending and receiving messages, a memory for buffering the messages, an interface for receiving signaling messages, a control means for administrating the group and a processing means for distributing the messages. The server enables a further terminal operating compliant to a circuit switched transmission protocol to participate in the conference session. The control means is adapted to register the participation of the further terminal in the conference session. Furthermore the server comprises an interface for receiving a request for sending a message for the conference session from the further terminal.

According to an advantageous embodiment of the server, the processing means is adapted to initiate releasing a circuit switched bearer towards the further terminal upon a detecting of an end of the message for the conference session. This has the advantage that network resources can be saved when no messages are sent by the first terminal at a certain time.

In an advantageous embodiment of the server the message for the conference session is a voice message.

In an advantageous embodiment of the server the processing means is adapted to initiate sending silence frames via a circuit switched bearer towards the further terminal upon a detecting of an end of the voice message. By this the bearer can be kept and be ready for a fast transmission of a further request for sending a message from the terminal.

In a further advantageous embodiment of the server it comprises tone detection means for detecting the request for sending the message from the further terminal. This provides a fault tolerant and reliable method to indicate the request for sending the message.

In a further advantageous embodiment of the server it comprises voice detection or voice recognition means for detecting a talk request from the further terminal. This provides the possibility to initiate the talk request via voice control to the user of the first terminal. This is a comfortable way of initiating the talk request.

In a further advantageous embodiment of the server it is implemented using different network nodes comprising a first node for administrating the group of terminals and a second node for enabling the group of terminals to exchange messages in the conference session.

In an embodiment of the invention a Media gateway enables participating of a first terminal operating compliant to a circuit switched transmission protocol in a conference session for distributing messages among a group of terminals operating compliant to a packet switched transmission protocol. The media gateway comprises interfaces for sending and receiving messages according to the packet switched and the circuit switched protocol and the media gateway comprises message conversion means for converting a message for the conference session from a payload format according to the packet switched protocol to a payload format according to the circuit switched protocol. Furthermore the Media gateway comprises at least one of tone detection, voice detection or voice recognition means for detecting a request for sending a message for the conference session from the first terminal and the Media gateway comprises a processing

system that is adapted to initiate a sending of a message indicating the request for sending the message for the conference session towards a server administrating the group of terminals.

By this a fault tolerant and reliable method is provided to indicate a request for sending a message.

In an embodiment of the Media gateway it comprises means for detecting an end of the message for the conference session and the processing system is adapted to initiate a sending of a message indicating the end of the message towards a server administrating the group of terminals.

In a further embodiment of the Media gateway the means for detecting the end of the message for the conference session comprises the voice detection or voice recognition means.

Brief description of the drawings

The following figures show:

Fig. 1: depicts a part of a network architecture for distributing a voice message within a group of packet switched and circuit switched terminals according to the invention.

Fig. 2 depicts a message sequence for sending a voice message by a circuit switched terminal within a conference session as invented.

Fig. 3 depicts a message sequence for sending a voice message within a conference session towards a circuit switched terminal according to the invention.

Fig. 4 depicts a core network node enabling the routing of a participation request for the conference session according to the invention.

Fig. 5 depicts a server as invented for administrating a group of terminals and enabling to exchange voice messages between the terminals.

Fig. 6 depicts a Media Gateway as invented for handling media streams.

Detailed description of embodiments

In the following the invention is described in more detail by means of embodiments and figures. Equal reference signs indicate equal elements.

Figure 1 depicts a network architecture for enabling a terminal operating compliant to a circuit switched transmission protocol, in the following called shortly the circuit switched terminal, to participate in a conference session for distributing voice messages within a group of terminals operating compliant with a packet switched transmission protocol, called herein shortly the group of packet switched terminals. The network architecture of figure 1 is appropriate for performing the message exchange procedures described in more detail for the figures 2 and 3.

The network architecture comprises a MS (mobile station) 301 as a terminal of the group of packet switched terminals. The group of terminals is administrated by the PTT (push-to-talk) server 303. Subscriber data related to the terminals in the group is stored related to the subscribers in a subscriber database 313 of a CSCF (call session control function) 310, that is connected to the MS 301 via SIP (session initiation protocol) interface 311. A group database 312 in the PTT server 303 is adapted to communicate with the subscriber database 313 in the CSCF 310 via a data exchange interface 314 and to a mobile subscriber data storage 315 in the MS 301 via a subscriber data exchange interface 302. In the group database 312 a session profile 309 is stored for a for conference sessions that is administrated by the PTT server 303. The session profile 309 comprises for instance an MSISDN (Mobile Station Integrated Services Digital Network) number of the MS 301 and an ISDN (Integrated Services Digital Network) number of the circuit switched terminal residing in a PSTN (public switched telephone network) 308. Furthermore a starting time, a duration and, by that, an ending time for the session is stored in the session profile 309. The PTT server 303 comprises a call control unit 316 participating in call control signalling procedures for the conference session and a media streaming unit 317 for processing media streams and participating in user-plane signalling procedures for the conference session. The PTT server 303 is connected to the PSTN 308 via a

MGCF (Media Gateway Control Function) 305 and via a MGW (Media Gateway) 307. The MGW 307, the MS 301, and the media streaming unit 317 of the PTT server 303 are interconnected by a RTP (real time protocol) interface 306. The CSCF 310, the MGCF 305, and call control unit 316 of the PTT server are interconnected via a SIP (session initiation protocol) interface 304.

Figure 2 depicts a sequence of messages that are exchanged during a sending of a message for a conference session by a circuit switched terminal CST. The message for the conference session can be a voice message, a message comprising a video sequence, a picture message, a text message, or any combination of these messages.

The sequence of messages is exchanged between instances of a telecommunication network. These instances are a mobile station MS, the circuit switched terminal CST, and instances of a core network of a mobile network. The core network comprises a call session control function CSCF, a home subscriber server HSS, a server PTT, a media gateway control function MGCF, a Media Gateway MGW, and a signalling gateway SG.

The call session control function CSCF is an IN (intelligent network) entity that is part of a network architecture used for providing a service for distributing messages for the conference session. This network architecture further comprises a server PTT administrating the group of terminals operating compliant to a packet switched transmission protocol, in the following called shortly the group of packet switched terminals. The network architecture further comprises the Media Gateway MGW handling payload and user-plane signalling as well as and the Media Gateway Control function MGCF which takes part in the call control signalling for the conference session. The conference session is used for distributing messages among the group of packet switched terminals. The mobile station MS is a terminal of the group of packet switched terminals. Subscriber data for the mobile station MS is stored in the home subscriber server HSS. The circuit switched terminal CST can be a fixed terminal of a PSTN (Public Switched Telecommunications Network) that is connected to the mobile network by the signalling gateway SG. Alternatively the circuit switched terminal CST can be a mobile terminal in a mobile network.

Establishing the group of terminals comprises registering an MSISDN (Mobile Station Integrated Services Digital Network Number) for each terminal of the group. Furthermore a starting time and an ending time can be defined for the session. To enable registering of the circuit switched terminal CST in the group and/or the session a number according to the E.164 of the ITU (International Telecommunication Union) used for registering to and/ or reaching the group is provided to the user of circuit switched terminal CST. If the circuit switched terminal CST is a mobile terminal the E.164 number can be sent to the circuit switched terminal CST user via an SMS (short message service) message. In an embodiment of the invention a call setup a message comprising the E.164 number as called party number and indicating a request for a participation of the circuit switched terminal CST in the conference session is sent is by the circuit switched terminal CST towards the server PTT. In particular a first IAM (initial address message) 11 is sent from the circuit switched terminal CST to the signalling gateway SG, an IP (internet protocol) IAM 12 is sent from the signalling gateway SG to the Media gateway control function MGCF and a first SIP (session initiation protocol) invite message 13 is sent from the Media gateway control function MGCF to the server PTT. The Media gateway control function MGCF comprises means for routing the call set up message comprising the E.164 number towards the server PTT. The E.164 number could e.g. comprise a prefix indicating a participation request for a session and the Media gateway control function MGCF could comprise a routing table for recognizing the prefix and routing the SIP invite message 13 towards the server PTT. The server PTT registers the participation of circuit switched terminal CST in the conference session. The server acknowledges the reception of the call set up message and the participation of the circuit switched terminal CST in the session. The acknowledgement can be implemented by sending a SIP '200 OK' message from the server PTT to the Media gateway control function MGCF in response to the SIP invite message 13. The Media Gateway control function MGCF forwards the acknowledgement by sending of an IP-ANM (answer message). The signalling gateway SG converts the IP-ANM to an ANM and sends it to the circuit switched terminal CST.

The circuit switched terminal CST sends a request for sending a message for the conference session towards the server PTT, i.e. a request that the circuit switched

terminal CST is to be enabled to send a message for the conference session towards the server PTT. In the context of a voice message the request for sending the message will be called a talk request. The request for sending a message can be sent in a further call set up procedure comprising a further IAM from the circuit switched terminal CST to the signalling gateway SG, a further IP -IAM from the signalling gateway SG to the Media gateway control function MGCF and a further SIP invite message from the Media gateway control function MGCF to the server PTT. Alternatively a first context 22 for transmitting payload according to the packet switched protocol and a circuit switched bearer 21 can be set up for connecting the circuit switched terminal CST and the server PTT and the request for sending a message can be sent via the first context 22 and the circuit switched bearer 21. The circuit switched bearer 21 is established between the circuit switched terminal CST and the Media Gateway MGW. The first context 22 for transmitting payload is established between the Media Gateway MGW and the server PTT. Preferably the circuit switched bearer 21 is a PCM (pulse code modulation) bearer. The RTP (real time protocol) can be used for transmitting payload via the first context 22. In case the request fis sent in-band, it can be sent as a tone or as a voice signal via the circuit switched bearer 21 from the circuit switched terminal CST to the Media Gateway MGW. The Media Gateway MGW recognises the request for sending a message according to the received signal and sends a user-plane signalling message indicating the request for sending a message towards the server PTT. Alternatively the tone or the voice signal can be transmitted further via the first context 22 between the Media Gateway MGW and the server PTT and the server PTT recognizes the request for sending a message according to the received signal.

The circuit switched terminal CST sends a message for the conference session message via the circuit switched bearer 21 and the first context 22. The message for the conference session is converted in the Media Gateway MGW from a payload format according to the circuit switched protocol to a payload format according to the packet switched protocol. The message for the conference session is buffered in the server PTT. The server PTT takes part in setting up contexts for transmitting payload according to the packet switched transmission protocol towards the packet switched terminals in the group. In particular a second context 50 for transmitting payload according to the packet switched transmission

protocol towards the mobile station MS is established. During establishing of the second context 50 towards the mobile station MS a second SIP invite message 31 is sent from the server PTT to the call session control function CSCF and a third SIP invite message 32 is sent further from the call session control function CSCF to the mobile station MS. To enable routing of the third SIP invite message the call session control function CSCF can perform a location query procedure towards the home subscriber server HSS. The reception of the third SIP invite message 32 can be acknowledged in a response '200 OK' and the reception of the second SIP invite message can be acknowledged in a further response '200 OK'. The message for the conference session is sent via the second context 50 from the server PTT to the mobile station MS.

The server PTT detects an end of the message for the conference session and according to the detecting of the end of the message for the conference session the server PTT initiates releasing the second context 50. In the context of the voice message as message for the conference session the detecting the end of the voice message can be performed using voice detection. Alternatively the circuit switched terminal CST can indicate the end of the voice message by sending a tone signal towards the server PTT. The tone signal can be recognised in the Media Gateway MGW and an indication of the end of the message for the conference session can be sent to the server PTT. Alternatively the tone signal can be converted in the Media Gateway MGW to payload according to the packet switched transmission protocol and sent further to the server PTT. The server PTT can perform tone detection and recognize the indication of the end of the voice message. Upon recognizing the end of the message for the conference session the server PTT initiates releasing the second context 50. To this end the server PTT can send a SIP BYE message 60 to the mobile station MS. The mobile station MS can acknowledge the reception of the SIP BYE message 60 in a fourth response '200 OK' message to the server PTT and the second context 50 is released.

In an embodiment of the invention the first context 22 and the circuit switched bearer 21 which together connect the circuit switched terminal CST and the server PTT are maintained to enable sending a further request for sending a message. In this embodiment a further request for sending a message from the circuit switched terminal can be send as

a tone or a voice message and the circuit switched terminal CST does not have to be adapted to be enabled to send the further request for sending a message.

According to another embodiment the first context 22 and the circuit switched bearer 21 which together connect the circuit switched terminal CST and the server PTT are released upon detecting an end of the voice message. According to yet another embodiment of the invention a decision whether the first context 22 and the circuit switched bearer 21 should be released can be taken. The decision can be taken in the circuit switched terminal CST e.g. according to a setting or a user input in the circuit switched terminal CST. Alternatively the decision can be taken depending on the type of the network connecting the circuit switched terminal CST. E.g. the circuit switched bearer 21 could be released, if the network connecting the circuit switched terminal CST comprises an air interface, i.e. if the circuit switched terminal CST is a mobile terminal. If the circuit switched terminal CST is a fixed terminal, the circuit switched bearer 21 and the first context 22 can be maintained. The type of the terminal can be determined by the server PTT and the server can perform the decision whether to release or maintain bearers and contexts.

If the circuit switched bearer 21 and the first context 22 are to be released by the circuit switched terminal CST the detecting the end of the message for the conference session can be implemented in the circuit switched terminal CST. Releasing the circuit switched bearer 21 and the first context 22 can for instance be implemented by sending a REL (release) message 41 from the circuit switched terminal CST to the signalling gateway SG, sending an IP-REL (release) message 42 from the signalling gateway SG to the media gateway control function MGCF, and sending a SIP BYE message 43 from the media gateway control function MGCF to the server PTT. The server PTT can reply to the SIP BYE message 43 in a SIP '200 OK' message to the media gateway control function MGCF. The media gateway control function MGCF can reply to the IP-REL (release) message 42 in an IP-RLC (release complete) message to the signalling gateway SG. The signalling gateway can reply to the REL (release) message 41 in a RLC (release complete) message to the circuit switched terminal CST.

Figure 3 depicts a sequence of messages that are exchanged during a sending of a message for a conference session by a mobile station MS. The message for the conference session can be a voice message, a message comprising a video sequence, a picture message, a text message, or any combination of these messages. To that end messages are exchanged between instances of a telecommunication network. The network architecture in that the instances of figure 3 collaborate for providing a conference service has been described related to figure 2 and will not be described newly. Furthermore the configuration of the session and the registration of the participation of the circuit switched terminal CST in the session corresponds to what has been described related to figure 2 and will therefore not be described newly.

The mobile station MS sends a request for sending a message for the conference session towards the server PTT, i.e. a request that the mobile station MS is enabled to a send a message for the conference session towards the server PTT. In particular the message for the conference session can be a voice message and the request for sending the message can be a talk request. The request for sending the message can be send as a SIP (session initiation protocol) invite message 101 from mobile station MS to the call state control function CSCF and as SIP invite message 102 from the call session control function CSCF to the server PTT. Routing the SIP invite message 102 can comprise a location query procedure between the call session control function CSCF and the home subscriber server HSS. The request for sending a message is registered in the server PTT and the server PTT acknowledges the reception of the SIP invite message 102 in a SIP response '200 OK' to the call session control function CSCF. Accordingly the call session control function CSCF acknowledges the reception of the SIP invite message 101 in a SIP response '200 OK' to the mobile station MS.

The server PTT recognizes the request for sending a message and initiates establishing a first context 14 for transmitting payload according to the packet switched protocol and a circuit switched bearer 142 which together connect the circuit switched terminal CST and the server PTT. Establishing the first context 141 and the circuit switched bearer can be implemented for example by sending a SIP invite message 110 form the server PTT to the media gateway control function MGCF, sending an IP-IAM (initial address message)

111 from the media gateway control function MGCF to the to the signalling gateway SG and sending an IAM 112 from the signalling gateway SG to the circuit switched terminal CST. The circuit switched terminal CST can respond to the IAM 112 in an ACM (acknowledgement message) and an ANM (answer message). The signalling gateway SG can respond to the IP-IAM 11 in an IP-ACM (acknowledgement message) and an IP-ANM (answer message). Responding of the media gateway control function MGCF to the SIP invite message 110 from the server PTT comprises sending a SIP '180 ringing' message and sending a SIP '200 OK' message.

A first context 120 for transmitting payload according to the packet switched protocol is set up between the mobile station MS and the PTT server for transmitting a message for the conference session as payload. In a preferred embodiment the RTP (real time protocol) can be used for transmitting payload via the first context 120.

The second context 141 for transmitting payload according to the packet switched protocol and the circuit switched bearer 142 are set up for connecting the server PTT and the circuit switched terminal CST. The second context 141 is set up between the server PTT and the media gateway MGW and the circuit switched bearer 142 is set up between the media gateway MGW and the circuit switched terminal CST. In a preferred embodiment the RTP (real time protocol) can be used for transmitting payload via the second context 141. The circuit switched bearer 142 can be a PCM (pulse code modulation) bearer.

A message for the conference session is sent by the mobile station MS to the server PTT, stored by the server PTT in a buffer and sent further to the circuit switched terminal CST. Sending the message for the conference session towards the circuit switched terminal CST comprises sending the message via the second context 141 from the server PTT to the media gateway MGW, converting the voice message from a payload format according to the packet switched protocol to a payload format according to the circuit switched protocol and sending the converted message via the circuit switched bearer 142 to the circuit switched terminal CST.

The server PTT detects an end of the message for the conference session. After said detection the server PTT can initiate releasing the first context 120 towards the mobile station MS. Alternatively the releasing of the first context 120 can be initiated by the mobile station MS. To this end the mobile station MS can send a SIP BYE message 130 to the server PTT. The server PTT can acknowledge the reception of the SIP BYE message 130 in a SIP response '200 OK' message to the mobile station MS and the first context 120 between the server PTT and the mobile station MS is released.

The second context 141 and the circuit switched bearer 142 can be maintained to enable sending a request for sending a message from the circuit switched terminal CST via the second context 141 and the circuit switched bearer 142. In this case and in the embodiment of the voice message as message for the conference session the server PTT sends silence frames towards the circuit switched terminal CST upon detecting the end of the voice message. The silence frames are sent via the second context 141 between the server and the media gateway MGF, the silence frames are converted from a payload format according to the packet switched protocol to a payload format according to the circuit switched protocol and the silence frames are sent further via the circuit switched bearer 142 from the media gateway MGW to the circuit switched terminal CST.

According to another embodiment the second context 141 and the circuit switched bearer 142 are released upon detecting an end of the message for the conference session. Detecting the end of the message can be performed in server PTT and the server PTT can initiate releasing the second context 141 and the circuit switched bearer 142. Releasing the second context 141 and the circuit switched bearer 142 can be implemented sending a SIP BYE message 151 from the server PTT to the Media Gateway Control Function MGCF, sending an IP-REL (release) message 152 from the Media Gateway Control Function MGCF to the Signalling Gateway SG and sending an REL (release) message 153 from the signalling gateway SG to the circuit switched terminal CST.

The circuit switched terminal CST can reply to the REL message 153 in a RLC (release complete) message to the signalling gateway SG. The signalling gateway SG can reply to the IP-REL (release) message 152 in an IP-RLC (release complete) message to the media

gateway control function MGCF. The Media Gateway Control Function MGCF can reply to the SIP BYE message 151 in a SIP '200 OK' message to the server PTT.

Figure 4 depicts a core network node CN enabling participating of a first terminal operating compliant to a circuit switched transmission protocol, called herein shortly the circuit switched terminal, in a conference session for distributing messages among a group of users of terminals operating compliant to a packet switched transmission protocol. The core network node CN comprises a routing table RT, an input link IL for receiving signalling messages from adjacent network nodes and an output link OL for sending signalling messages to adjacent network nodes. Such signalling messages can be e.g. call set up messages. The routing table RT is used for analyzing an address of a signalling message and routing the signalling message to the appropriate adjacent network node. To enable participation of circuit switched terminal in the conference session a conference or group address is assigned to the conference session or to the group. A call set up message comprising the conference or group address as destination address is indicating a request for participation of the circuit switched terminal in the conference session. The routing table RT is configured such as to provide routing a call set up message received via the input link IL and comprising the group or conference address as destination address towards a server administrating the group. The call setup message is sent towards the server administrating the group via the output link OL. The core network node further comprises an interface IF for sending and receiving messages and a processing system PS adapted to process a request for sending a message for the conference session and to forward the request via the interface IF towards the server administrating the group.

Figure 5 depicts a server S for administrating a group of terminals operating compliant to a packet switched transmission protocol, called herein shortly the group of packet switched terminals. Figure 5 depicts functional units of the server S that can be implemented in software in hardware or in any combination thereof. The server S enables the group of packet switched terminals to exchange messages in a conference session. To that end the server S comprises a message interface MI, which is adapted for sending and receiving the messages, that are exchanged among the group of packet switched

terminals. Furthermore the server comprises a signalling means SM for establishing and releasing a bearer for transmitting the messages. Said signalling means SM are also adapted to receive further signalling messages. The server S further comprises a message buffer MB for storing messages and a processing system PS for administrating the group and distributing the messages within the group. The processing system can be implemented in a control means for administrating the group and a separate processing means for distributing the messages. When implementing the server S as a distributed system, the control means and the processing means can be hosted on different entities. The signalling means SM connect the server S to further network nodes for exchange of call control signalling messages. The message interface MI connects the server S to further network nodes for exchange of payload and user plane signalling messages.

The server S enables a further terminal operating compliant to a circuit switched transmission protocol and called herein shortly the circuit switched terminal to participate in the conference session. To that end the processing system PS is adapted to process a call setup message received via the signalling means SM and indicating a request for a participation of the circuit switched terminal in the conference session and to register the participation of the circuit switched terminal in the conference session. The server S is further adapted to receive a request for sending a message for the conference session form the circuit switched terminal, i.e. a request to be enabled to send a message for the conference session. Said request can e.g. be received by the server S via the signalling means SM or via the message interface MI. Upon detecting the request for sending the message the signalling means SM take part in a message exchange procedure for setting up a bearer connecting the message interface MI to the circuit switched terminal. A message for the conference session is received via the bearer in the message interface MI, processed by the processing system PS and forwarded to the message buffer MB. The message is distributed within the group via the message interface MI. The processing system PS is adapted to detect an end of the message and to initiate releasing contexts for transmitting payload according to a packet switched protocol upon said detecting of the end of the message. To that end a sequence of signalling messages can be exchanged between the signalling means SM and further network nodes.

The request for sending a message can be sent as a tone signal via the message interface MI. In that case the processing system PS can comprise tone detection means for detecting the request. In a preferred embodiment of the invention the message to be distributed within the group of packet switched terminals can be a voice message. In that case the processing system PS can comprise voice detection or voice recognition means for detecting a talk request from the circuit switched terminal. The voice detection or voice recognition means can be further controlled by the processing system PS to detect an end of the voice message. The processing system PS can be adapted to initiate sending silence frames via a circuit switched bearer towards the circuit switched terminal upon notice of the detecting the end of the voice message. Alternatively the processing system PS can be adapted to initiate releasing a circuit switched bearer towards the circuit switched terminal upon notice of said detecting the end of the voice message. To that end a sequence of signalling messages can be exchanged between the signalling means SM and further network nodes.

Figure 6 depicts a media gateway MGW as part of a system architecture for enabling a first terminal operating compliant to a circuit switched transmission protocol and called herein shortly the circuit switched terminal to participate in a conference session for distributing messages. The conference session is used for distributing the messages among a group of terminals operating compliant to a packet switched transmission protocol, called herein shortly the group of packet switched terminals. Figure 6 depicts functional entities of the media gateway that can be implemented in hardware in software or in any combination thereof. The media gateway comprises a circuit switched media interface CSMI for sending and receiving messages according to a circuit switched transmission protocol and a packet switched media interface PSMI for sending receiving messages according to a circuit switched transmission protocol. Furthermore the media gateway MGW comprises message conversion means MC for converting a message from a payload format according to the packet switched protocol to a payload format according to the circuit switched transmission protocol and vice versa. A processing means PM is connected to the circuit switched media interface CSMI, the packet switched media interface PSMI and to the message conversion means MC for coordinating and controlling the units.

In an embodiment of the invention the media gateway comprises first detection means DM1, e.g. voice or tone detection means for detecting a request for sending a message from the circuit switched terminal. Said detection means are connected to the processing means PM for message exchange.

A request for sending a message can be received as payload in the circuit switched media interface CSMI. Said request can be detected using the first detection means DM1 and the processing means PM can initiate sending a message indicating the request towards a server administrating the group of terminals. The indicating message can be sent via the packet switched media interface PSMI.

The message can be a voice message.

Furthermore the media gateway MGW can comprise second detection means DM2 for detecting an end of the message. In the context of the voice message said second detection means DM2 can be voice detection means for detecting the end of the message using voice detection or voice recognition. Said second detection means DM2 is connected to the processing means PM for message exchange.

The end of the message can be detected using the second detection means DM2 and the processing means PM can initiate sending a message indicating the end of the message towards a server administrating the group of terminals. The indicating message can be sent via the packet switched media interface PSMI.

The first and the second detection means DM1 and DM2 can be implemented as one entity or using different entities.

Claims

1. Method for enabling a first terminal (CST) adapted to operate compliant to a circuit switched transmission protocol to participate in a conference session for distributing messages among a group of terminals (301; MS) adapted to operate compliant to a packet switched transmission protocol, the method comprising the steps of:
- registering a participation of the first terminal (CST) in the conference session by a server (PTT) administrating the group,
- receiving a request (102) for sending a message for the conference session,
- setting up a circuit switched bearer (21) for transmitting the message,
- sending the message according to either the packet switched protocol or the circuit switched protocol,
- buffering the message,
- converting the message from a payload format according to the packet switched transmission protocol to a payload format according to the circuit switched transmission protocol or vice versa, and
- sending the converted message.

2. Method for enabling a first terminal (CST) to participate in a conference session by a server (PTT)
wherein the first terminal (CST) is adapted to operate compliant to a circuit switched transmission protocol, the conference session being used for distributing messages among a group of terminals (MS) adapted to operate compliant to a packet switched transmission protocol, wherein the server (PTT) is administrating the group, the method comprising the following steps executed by the server:
- registering a participation of the first terminal in the conference session,
- receiving a request (102) for sending a message for the conference session,
- taking part in setting up a bearer (21; 22; 50) for transmitting the message,
- receiving a message according the packet switched protocol,

- buffering the message, and
- sending the message.

3. Method according to claim 2 wherein the server (PTT) is adapted to initiate a releasing of the circuit switched bearer (21) after a detecting of an end of the message.

4. Method according to claim 2 wherein the server (PTT) is adapted to initiate a sending of silence frames via the circuit switched bearer (21) after a detecting of an end of the message.

5. Method according to claims 2 or 4 wherein the server (PTT) is adapted to receive a request for sending a message which is sent by the first terminal via the circuit switched bearer.

6. Method according to claim 5 wherein the request for sending a message is detected by the server (PTT) using tone detection.

7. Method according to claim 5, wherein the message is a voice message and wherein the request for sending a message is detected by the server (PTT) using voice detection or voice recognition.

8. Core network node (MGCF; CN) for enabling participating of a first terminal (CST) operating compliant to a circuit switched transmission protocol in a conference session for distributing messages among a group of users of terminals (MS) operating compliant to a packet switched transmission protocol, the core network node (MGCF) comprising means (RT) for routing a call set up message (13) indicating a request for a participation of the first terminal (CST) in the conference session towards a server (PTT) administrating the group, interfaces for sending and receiving messages and a processing system adapted to process a request for sending a message for the

conference session and to forward the request towards the server (PTT) administrating the group

9. Server (PTT) for administrating a group of terminals (MS) operating compliant to a packet switched transmission protocol, the server (PTT) enabling the group of terminals to exchange messages in a conference session, the server (PTT) comprising
- an interface for receiving a request for sending a message for the conference session,
- signaling means for establishing and releasing a bearer for transmitting a message,
- interfaces for sending and receiving messages,
- a memory for buffering the messages,
- an interface for receiving signaling messages,
- a control means for administrating the group and a processing means for distributing the messages,
wherein the server (PTT) is characterized in that
it enables a further terminal (CST) operating compliant to a circuit switched transmission protocol to participate in the conference session and in that
the control means is adapted to register the participation of the further terminal (CST) in the conference session, and in that the server (PTT) comprises an interface for receiving a request for sending a message for the conference session from the further terminal (CST).

10. Server (PTT) according to claim 9, wherein the processing means is adapted to initiate releasing a circuit switched bearer towards the further terminal (CST) upon a detecting of an end of the message for the conference session.

11. Server (PTT) according to claim 9, wherein the message for the conference session is a voice message.

12. Server (PTT) according to claim 11, wherein the processing means is adapted to initiate sending silence frames via a circuit switched bearer towards the further terminal (CST) upon a detecting of an end of the voice message.

13. Server (PTT) according to claims 9, 11 or 12 comprising tone detection means for detecting the request for sending the message from the further terminal (CST).

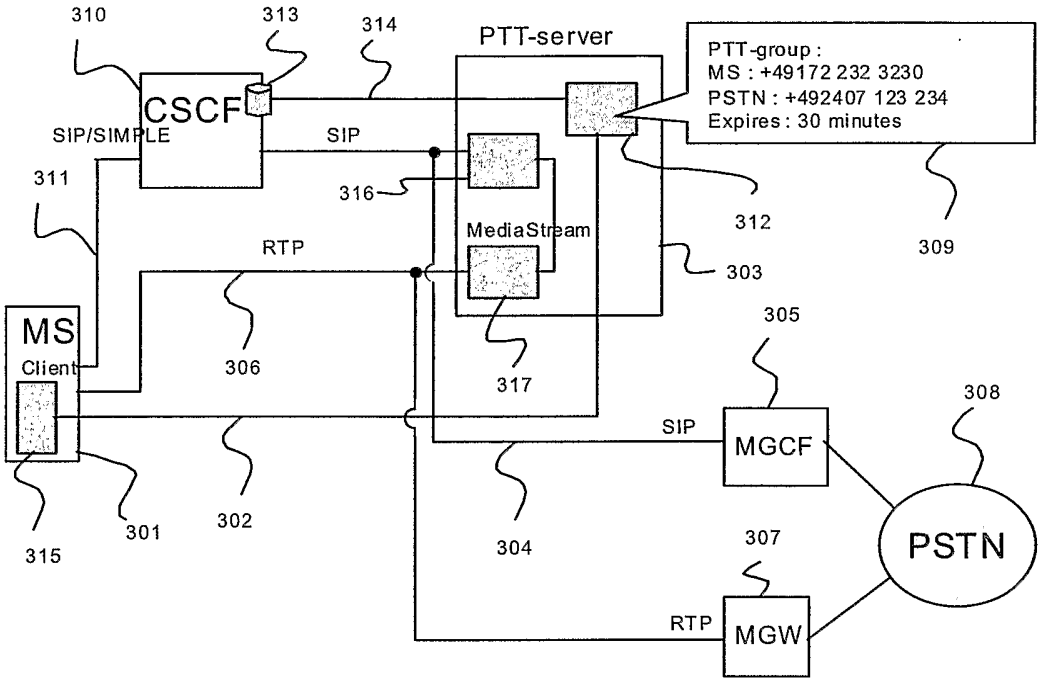
14. Server (PTT) according to claim 11 or 12, comprising voice detection or voice recognition means for detecting a talk request from the further terminal (CST).

15. Server (PTT) according any of the claims 9 to 14 implemented using different network nodes comprising a first node for administrating the group of terminals (MS) and a second node for enabling the group of terminals to exchange messages in the conference session.

16. Media gateway (MGW) for enabling participating of a first terminal (CST) operating compliant to a circuit switched transmission protocol in a conference session for distributing messages among a group of terminals operating compliant to a packet switched transmission protocol, the media gateway (MGW) comprising interfaces for sending and receiving messages according to the packet switched and the circuit switched protocol and the media gateway (MGW) comprising message conversion means for converting a message for the conference session from a payload format according to the packet switched protocol to a payload format according to the circuit switched protocol, characterized in that
the Media gateway (MGW) comprises at least one of tone detection, voice detection, or voice recognition means for detecting a request for sending a message for the conference session from the first terminal (CST) and the Media gateway (MGW) comprises a processing system that is adapted to initiate a sending of a message indicating the request for sending the message for the conference session towards a server (PTT) administrating the group of terminals.

17. Media gateway (MGW) according to claim 16, comprising means for detecting an end of the message for the conference session wherein the processing system is adapted to initiate a sending of a message indicating the end of the message towards a server (PTT) administrating the group of terminals.

18. Media gateway (MGW) according to claims 16 and 17 wherein the means for detecting the end of the message for the conference session comprises the voice detection or voice recognition means.


310
313
314
PTT-server
PTT-group :
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PSTN : +492407 123 234
Expires : 30 minutes
CSCF
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SIP
311
316
312
MediaStream
309
RTP
303
MS
Client
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301
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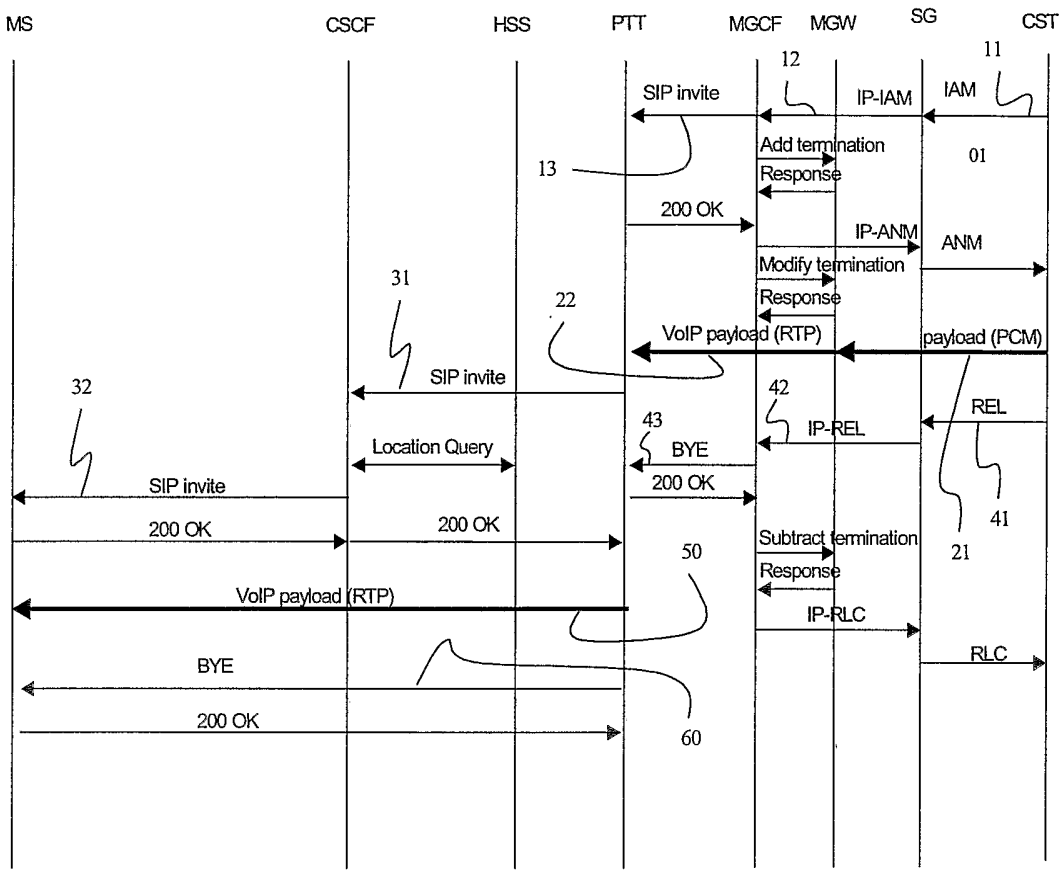
307
RTP
MGW

Fig.1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CSCF
HSS
PTT
MGCF
MGW
SG
CST
11
12
SIP invite
IP-IAM
IAM
Add termination
01
13
Response
200 OK
IP-ANM
ANM
Modify termination
31
22
Response
VoIP payload (RTP)
payload (PCM)
SIP invite
32
42
REL
43
IP-REL
Location Query
BYE
SIP invite
200 OK
41
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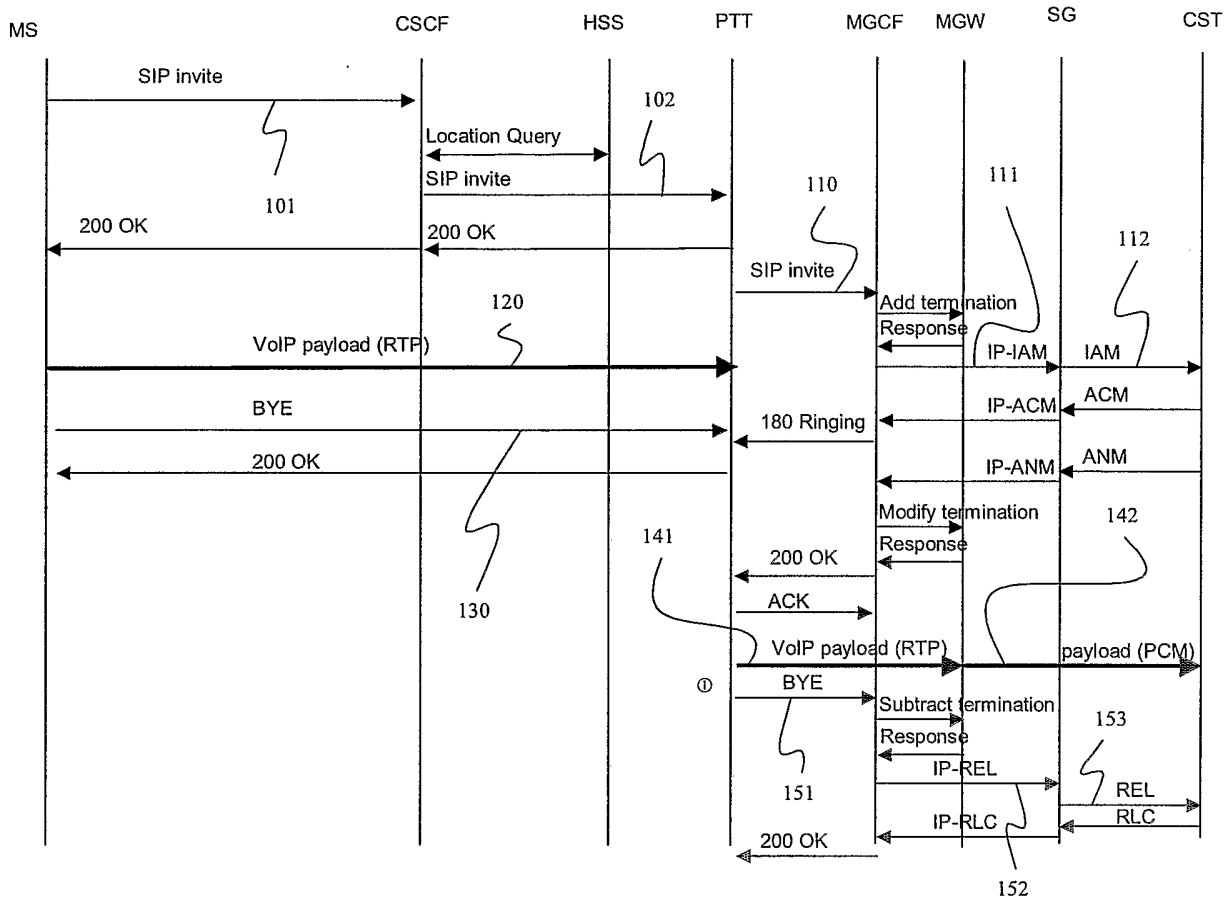
Subtract termination
21
50
Response
VoIP payload (RTP)
IP-RLC
RLC
BYE
200 OK
60

Fig. 2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CSCF
HSS
PTT
MGCF
MGW
SG
CST
SIP invite
101
Location Query
SIP invite
102
200 OK
200 OK
110
SIP invite
111
112
Add termination
Response
120
VoIP payload (RTP)
IP-IAM
IAM
BYE
IP-ACM
ACM
180 Ringing
200 OK
IP-ANM
ANM
Modify termination
Response
142
141
200 OK
130
ACK
VoIP payload (RTP)
payload (PCM)
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BYE
Subtract termination
153
Response
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REL
151
IP-RLC
RLC
200 OK
152

Fig.3

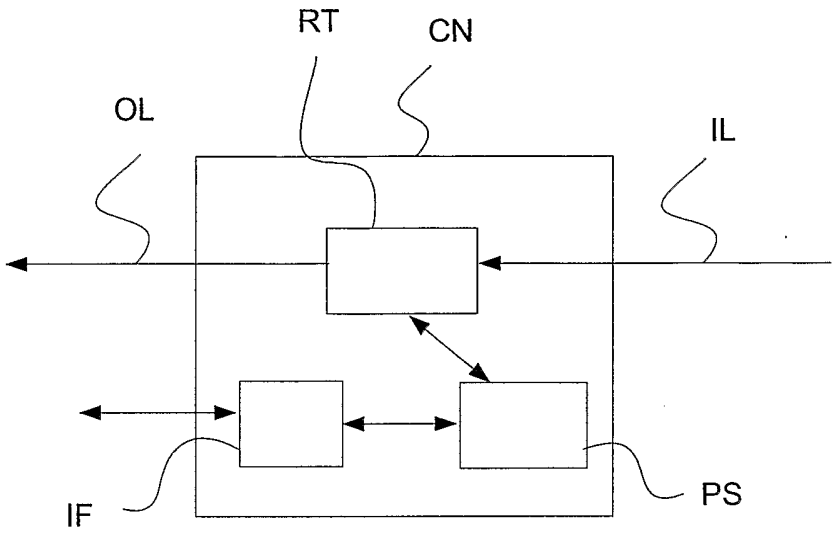

Fig. 4

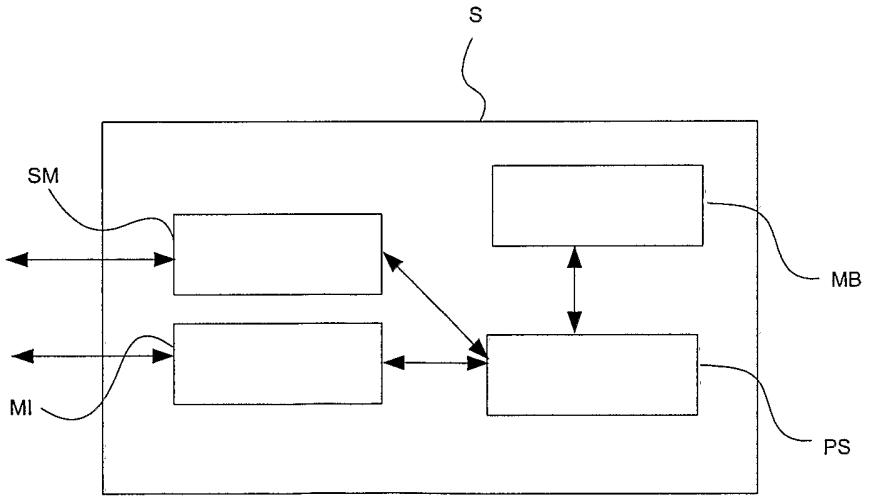

Fig. 5

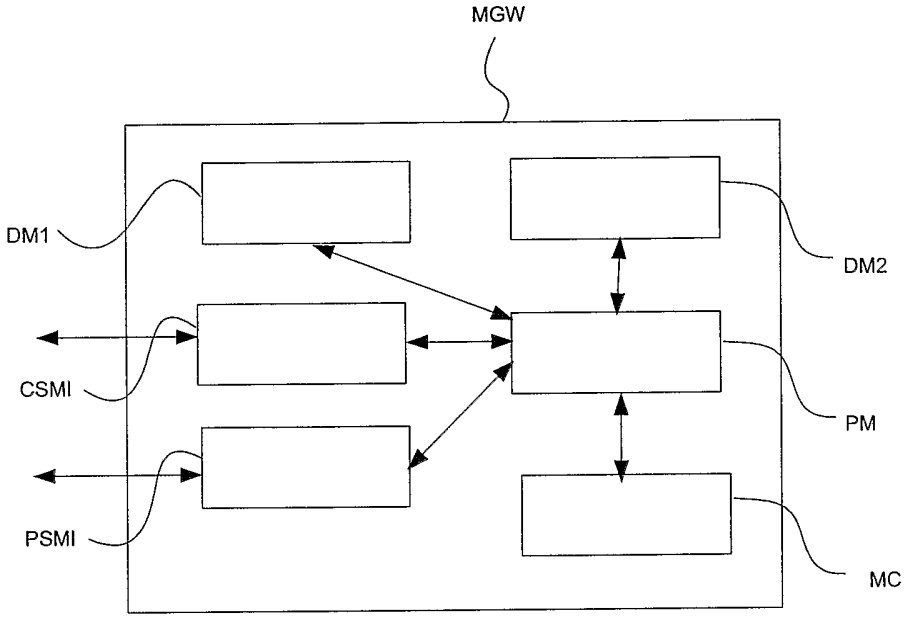

Fig. 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/07469

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L12/18 H04Q7/28 H04Q7/22

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)
IPC 7 H04Q 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 182 895 A (LUCENT TECHNOLOGIES INC) 27 February 2002 (2002-02-27) paragraph '0035! - paragraph '0052! paragraph '0055!	1-6, 8-13, 15-18
Y	---	7,14
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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 February 2004	15/03/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Ströbeck, A.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP 03/07469

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