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(54) Benævnelse: **Lokal omskiftning af lokale opkald ved handover**

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DESCRIPTION

TECHNICAL FIELD

[0001] The present invention relates generally to telecommunications systems, and in particular, to methods, systems, devices and software associated with local call local switching at handover in radio communication systems.

BACKGROUND

[0002] Radiocommunication networks were originally developed primarily to provide voice services over circuit-switched networks. The introduction of packet-switched bearers in, for example, the so-called 2.5G and 3G networks enabled network operators to provide data services as well as voice services. Eventually, network architectures will likely evolve toward all Internet Protocol (IP) networks which provide both voice and data services. However, network operators have a substantial investment in existing infrastructures and would, therefore, typically prefer to migrate gradually to all IP network architectures in order to allow them to extract sufficient value from their investment in existing infrastructures. Also to provide the capabilities needed to support next generation radio communication applications, while at the same time using legacy infrastructure, network operators could deploy hybrid networks wherein a next generation radio communication system is overlaid onto an existing circuit-switched or packet-switched network as a first step in the transition to an all IP-based network. Alternatively, a radio communication system can evolve from one generation to the next while still providing backward compatibility for legacy equipment.

[0003] One example of such an evolved network is based upon the Universal Mobile Telephone System (UMTS) which is an existing third generation (3G) radio communication system that is evolving into High Speed Packet Access (HSPA) technology. Yet another alternative is the introduction of a new air interface technology within the UMTS framework, e.g., the so-called Long Term Evolution (LTE) technology. Target performance goals for LTE systems include, for example, support for 200 active calls per 5 MHz cell and sub 5 ms latency for small IP packets. Each new generation, or partial generation, of mobile communication systems add complexity and abilities to mobile communication systems and this can be expected to continue with either enhancements to proposed systems or completely new systems in the future.

[0004] Local Call Local Switch (LCLS) is an ongoing work item within the 3GPP standardization groups GERAN (GSM/EDGE Radio Access Network) and CT (Core Network and Terminals) which is intended to save transmission resources of the Abis and/or A-interface. The LCLS feature provides the capability for the user plane (i.e. the voice data path) to be locally switched within the BSS (e.g. voice data in user plane is not backhauled to the CS

Core Network) for calls that are generated and terminated by users that are served by the same BSS. The result is saving of transmission resources on the Abis and/or A-interface. LCLS may be supported on both TDM based A-interface (AoTDM) and IP based A-interface (AoIP). The stage 2 work of the LCLS feature is specified in the 3GPP Technical Specification 23.284 bounded for Release-10 in March 2011. Document 3GPP TS 23.284, V1.2.0 (2011-02), 3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Local Call Local Switch; Stage 2 (Release 10), in section 8.4.1.1.7.2 and figure 8.4.1.1.7.2.1 refers to a basic sequence for inter-BSS handover that breaks LCLS. However, there remain a number of issues regarding how to, for example, handover a user equipment (UE) that has an ongoing call which is locally switched to a target BSS or RNS which does not support the LCLS feature.

ABBREVIATIONS/ACRONYMS

[0005]

A-interface
	Interface between the BSC and the MSC\
A-link
	Interface between the BSC and the MSC
Abis
	Interface between the BTS and BSC
3GPP
	3rd Generation Partnership Project
BSC
	Base Station Centre
BSS
	Base Station Subsystem
BTS
	Base Station System
CN
	Core Network
CS
	Circuit Switched *Core Network*
CT
	Core Network and Terminals
DL
	Down Link
GERAN
	GSM/EDGE Radio Access Network
IE
	Information Element
Iu

Interface between MSC and RNC

LCLS
Local Call Local Switch

LTE
3GPP Long Term Evolution

Mc
Interface between MSC and MGW

MGW
Media Gate-Way

MSC
Mobile Switching Centre

MSS
Mobile Switching Centre Server

Nc
Interface between MSCs

oA
A-interface originating call

RAT
Radio Access Technology

RNC
Radio Network Controller

RNS
Radio Network Subsystem

tA
A-interface terminating call

TDM
Time Division Multiplexing

UE
User Equipment

UL
Up Link

UMTS
Universal Mobile Telecommunications System

SUMMARY

[0006] The invention is defined by independent claim 1, which refers to a method in a core network node, and by independent claim 10, which refers to a core network node. In the following, parts of the description and drawings referring to embodiments which are not covered by the claims are not presented as embodiments of the invention, but as examples useful for understanding the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The exemplary embodiments described below will be understood, in conjunction with the drawings submitted herewith in which:

Figure 1 depicts various nodes associated with a locally switched local call in a radio communication system;

Figure 2 depicts signaling associated with a handover involving a locally switched local call according to an embodiment;

Figure 3 depicts signaling associated with a handover involving a locally switched local call according to another embodiment;

Figure 4 depicts signaling associated with a handover involving a locally switched local call according to yet another embodiment

Figure 5 depicts signaling associated with a handover involving a locally switched local call according to one another embodiment

Figure 6 illustrates a node which can be used to implement embodiments.

DETAILED DESCRIPTION

[0008] The following detailed description of the exemplary embodiments refers to the accompanying drawings. The same reference numbers in different drawings identify the same or similar elements.

[0009] As mentioned briefly above, handover in the context of local call local switched (LCLS) calls presents certain challenges. In order to better understand these challenges, Figure 1 depicts various nodes and interfaces which are involved in an LCLS call.

[0010] The "active" User Plane path 100 is for a call between two UEs 102 and 104 wherein local switching is provided between two BTS's, 106 and 108, while the "inactive" User Plane path 109, i.e. the two Abis-links, the two A-links and the links within the Core Network, are not carrying traffic and are therefore marked with dotted lines. The Control Plane paths 110 are also illustrated in Figure 1. Moreover, the radio access network part RAN 117 and the core network part CN 116 are illustrated in figure 1. As can be seen from figure 1, the radio access network RAN 117 in the embodiment in figure 1 comprises the BCS/BSS 114 and the two BTS's 106 and 108. In this example, the BSC/BSS 114 has the capability to perform local call switching, however other BSC/BSSs may not have such a capability. Various elements in the core network 116 are also shown including the originating MSC (oMSC)118, an intermediate MSC (iMSC) 120 and terminating MSC (tMSC) 122 in the signaling/control plane and various MGWs 124 in the data/control plane.

[0011] LCLS is typically attempted to be instantiated during the call establishment phase in a radiocommunication system. During this phase, negotiation for support of LCLS is performed within the core network (CN) and requests to correlate and connect the originating and terminating terminals (a.k.a. call legs) are made to the BSS when LCLS is successfully negotiated. Interaction with existing supplementary services, lawful intercept and handover are supported. Depending on the scenario, when such supplementary services are invoked, this may require a break of an existing, locally switched call where the voice data on the user plane is routed via the core network.

[0012] When a call is locally switched through the BSS and an inter-system handover occurs to, e.g., an UMTS/LTE RAT, or an inter-BSS handover within the same RAT occurs to a BSS that does not support the LCLS feature, then the locally switched call is broken and normal core network switched user plane is resumed. For example, consider that a mobile station 102 (UE-1) which has an ongoing call that is locally switched in the system of Figure 1, is handed over to a target BSS (not shown in Figure 1), or a target RNS, which does not support the LCLS feature. As part of the inter-BSS handover preparation phase and the inter-system handover preparation phase, the anchor MSC sends a message to the BSS 114 (or BSC) controlling the call leg of the stationary mobile station 104 (UE-2, i.e., the mobile station that is not subject to a handover), requesting the BSS 114 to start sending user plane data UL to the core network in addition to the locally switched user plane data sent between UE-1 102 and UE-2 104. In the core network the user plane data from UE-2 104 is transmitted to the target BSS (or, respectively, target RNS), where it eventually will be received by UE-1 102 (when UE-1 102 has moved to the target BSS (respectively target RNS) once the handover is successfully completed).

[0013] 3GPP Technical Specification 23.284 specifies that the BSS controlling the call leg of the stationary mobile station (UE-2, the mobile station that is not subject to a handover) at the reception of the above message from the MSC also shall be prepared to receive user plane data DL from the Core Network originating from UE-1 when the mobile station eventually has moved to the target BSS (respectively to the target RNS).

[0014] This solution implies that this BSS has to autonomously, i.e. without any explicit assistance from the CN, switch the incoming user plane data path between the locally switched connection and the Core Network switched path, when user plane data from the Core Network is detected in the BSS.

[0015] This specific solution will unnecessarily increase the complexity of the BSS implementation when LCLS is implemented in a BSS communicating with the core network via a TDM based A-interface. The reason for this is that the TDM time slot pattern for TDM time slots "not in use" and TDM time slots "in use but not containing any user data" on the A-interface are not standardized, hence interoperability between different BSS/MSS vendors will most likely not be ensured.

[0016] The3GPP specification referred to earlier also provides an alternative in case the in-band switch in the BSS based on the detection of the valid user plane, as described above, cannot be implemented in the BSS or will not work due to e.g. interoperability problems. In this case a Clear Command message sent from the anchor MSC (triggered by a Handover Complete message received from the target BSS (or by a Relocation Complete message received from the target RNS on the Iu interface) at the successful completion of the handover procedure) to the old serving BSS of the handed over mobile station (UE-1) will break local switching and resume normal user plane switching through the Core Network from both ends. This means that the BSS controlling the call leg of the stationary mobile station (UE-2, the mobile station which is not subject to a handover) will no longer use the locally switched user plane path as that path has been broken and thus receive the user plane addressed to UE-2 from the CN. However the usage of the Clear Command message in the BSS for the purpose of triggering the switch of the user plane data path towards UE-2 104 will cause a longer break in the speech flow between the two parties compared to the same handover scenario in the legacy network (without any impact of the LCLS feature). More specifically, in a legacy network the change of the target MGW user data path from one-way to both-way is triggered already at the reception of the Handover Detect message (respectively the Relocation Detect message received on the Iu interface) in the target MSC, giving the network the possibility to transmit user data from the handed over mobile station to the other end as soon as the mobile station has completed the handover. The time lag between the Handover Detect message and the Handover Complete message (or between the Relocation Detect message and the Relocation Complete message) has, in live networks, been measured from 200 ms up to 600 ms. This will result in an audible break in the speech flow from UE-1 102 to UE-2 104 if the Handover Complete/Clear Command message (or the Relocation Complete/Clear Command message) is used to trigger the switch of the user plane data path towards the stationary mobile unit during a handover involving LCLS.

[0017] Instead, according to embodiments, the core network can assist in switching the user plane path for a call using LCLS which is being handed over. For example, when the mobile station 102 (UE-1) has tuned to the assigned channel in the target cell and the target BSS (or target RNS) has detected the new mobile station, the target BSS (or target RNS) will send the Handover Detect message (respectively Relocation Detect message) to its serving MSC. This Handover Detect message, per se, is a legacy part of the inter-BSS handover and inter-system handover to UMTS procedures, see for example, 3GPP TS 44.018, 3GPP TS 48.008, 3GPP TS 23.205 and 3GPP TS 23.009. However, the reception of the Handover Detect message in the MSC according to embodiments will trigger the sending of a new control message, or an enhanced or modified version of a legacy control message, to the BSS serving the call leg of the other (stationary) mobile station (UE-2). Upon reception of the new control message, or the enhanced or modified version of a legacy control message, the BSS will switch the user plane data path from the locally switched connection to the Core Network switched path. As a result the user plane data is now transmitted from UE-1 102 through the Core Network to the BSS where it is further sent to UE-2 104.

[0018] Figure 2 shows an exemplary signaling sequence for an embodiment wherein an inter-BSS handover breaks LCLS, and where the call leg belonging to UE-1 is handed over from the serving BSS-1 to the target BSS. Note that in this example, BSS-1 is the same as BSS-2 when LCLS is established for the call, i.e., local call switching is being performed prior to the handover as indicated by arrows 200. At step/signal 202, a Handover Required message is sent from BSS-1 114 requesting an inter-BSS handover for UE-1 102. The Serving BSS-1 114 shall continue to forward the user plane data locally from UE-1 102 to UE-2 104 as long as UE-1 is served by BSS-1.

[0019] The Anchor MSC-1 server sends the Handover Request message, as shown in step/signal 204, to the Target BSS 203 with the LCLS-Connection-Status-Control IE indicating "Connect" to through-connect the local call. The Target BSS 203 returns the Handover Request Acknowledge message 206 indicating that the call is not possible to be locally switched since, e.g., Target BSS 203 does not have the LCLS capability.

[0020] After receiving a message 210 from the anchor MSC 118 regarding LCLS disconnection, the far end MSC-2 server 208 requests the BSS-2 114 to start sending user plane data UL with the LCLS-Connect-Control message 212 and the LCLS-Connection-Status-Control Information Element (IE) indicating "BicastAtHandover". This triggers BSS-2 114 to bi-cast user plane data from UE-2 UL to the Core Network (MGW-2 124) in addition to the locally switched user plane data sent between UE-1 102 and UE-2 104. In the Core Network the user plane data is transmitted to the Target BSS 203 where it eventually will be received by UE-1 102 (when UE-1 102 has moved to the Target BSS 203). Message 212 is acknowledged via message 213.

[0021] The Anchor MSC-1 118 server sends the BSSMAP Handover Command message 214 to the Serving BSS-1 114 which will trigger the BSS to send the Handover Command message 216 to UE-1 102. When UE-1 102 is detected in the Target BSS 203, the Handover Detect message 218 is sent to the Anchor MSC-1 118.

[0022] According to embodiments, the Handover Detect message 218 can serve as a trigger for the user plane data path switch in the BSS. For example, upon reception of the Handover Detect message 218, the Anchor MSC-1 server 118 sends an LCLS status change message 220 re-using the LCLS-Status-Update message but with a new value in the LCLS-Status-Change-Request IE to the succeeding MSC server 208. The far end MSC-2 208 server requests BSS-2 114, via message 222, to switch Down Link (DL) user plane data path on purpose to start receiving user plane data from the Core Network 116 originating from UE-1 102.

[0023] According to one embodiment, the message 222 does not explicitly request BSS-2 (and BSS-1) to break local switching, i.e. BSS-1/BSS-2 may continue to send user plane data locally. For this embodiment, the break of local switching is initiated at reception of the Clear

Command message in the old serving BSS-1, i.e., signal 226 described below. As an alternative embodiment, MSC-2 server 208 requests BSS-2 114 to break local switching and to start receiving user plane data DL from the Core Network originating from UE-1, i.e. the message 222 will stop BSS-1 and BSS-2 from sending user plane data locally between UE-1 and UE-2. Normal Core Network switched user plane is now resumed at both ends. The message 222 sent from the MSC-2 server 208 to BSS-2 114 could, for example, be a completely new message or a re-use of the existing LCLS-Connect-Control message with a new value in the LCLS-Connection-Status-Control IE

[0024] In the Handover Complete message 224, the Target-BSS 203 indicates to the MSC-1 server 118 in the LCLS-BSS-Status IE that the call is not possible to be locally switched. The MSC-1 server 118 requests the old serving BSS-1 114 to clear the old call leg via Clear Command message 226. In the3GPP specification referred to earlier the Clear Command message will also break the local switching, i.e. sending of user plane data locally between UE-1 and UE-2 is now stopped. However, as an alternative (described above) the release of local switching can already be done at the reception of the new control message 222 in BSS-2.

[0025] The Serving BSS-2 114 informs the MSC-2 server 208 that LCLS is broken via LCLS-Notification message 228. Clearing of the old call leg in the Serving BSS-1 is completed as indicated by message 230 and the Anchor MSC-1 server 118 informs succeeding Core Network nodes that LCLS is finally disconnected via message 232. At this time, the normally switched user plane is established between UE -1 102 and UE-2 104, as indicated by arrows 234.

[0026] Similar signaling/steps can be used according to embodiments and examples for performing an inter-system handover which terminates local switching, e.g., to a UMTS RAT, an example of which is provided as Figure 3. Note that since similar nodes are used in this embodiment relative to that of Figure 2, the same node numbering is used in Figure 3 to reference the similar nodes. However, since this figure depicts an inter-system handover to a UMTS RAT, as opposed to an intra-system handover, the target node may be labeled as an RNS rather than a BSS in this example. Note further that inter-system handovers according to embodiments and examples are not limited to UMTS RATs, but can be performed between any desired RATs, e.g., toward LTE RATs, etc. Thus the nodes illustrated and discussed below with respect to Figure 3 as BSSs, MSCs, MGWs and RNSs can more generally be referred to as communication nodes and may be implemented differently in other RATs, e.g., LTE. For example, one or more of the nodes illustrated in Figure 3 and discussed below can, instead, be an eNodeB or a node in an Evolved Packet Core (EPC), or any other communication node which performs the same or similar functions to those illustrated in Figure 3.

[0027] Again, prior to the handover, UE-1 102 and UE-2 104 are connected via a locally switched call using the same BSS 114 as indicated by arrows 302. Then, a Handover Required message 304 is sent from BSS-1 114 requesting an inter-System handover for UE-1 102. The Serving BSS-1 114 shall continue to forward the user plane data locally from UE-1 102 to UE-2 1-4 as long as UE-1 102 is served by BSS-1 114. The Anchor MSC-1 server 118 sends the

Relocation Request message 306 to the Target RNS, and the target RNS returns the Relocation Request Acknowledge message 308. Upon being informed of the change in LCLS status via message 310, the far end MSC-2 server 208 requests the BSS-2 114 to start sending user plane data UL with the LCLS-Connect-Control message 312 and the LCLS-Connection-Status-Control IE indicating "BicastAtHandover". Message 312 can be acknowledged by BSS-2 114 via message 313.

[0028] Receipt of message 312, triggers BSS-2 114 to bi-cast user plane data from UE-2 UL to the Core Network 116 (e.g., MGW-2 124) in addition to the locally switched user plane data sent between UE-1 102 and UE-2 104. In the Core Network 116 the user plane data is transmitted to the Target RNS where it eventually will be received by UE-1 102 (when UE-1 102 has moved to the Target RNS). The Anchor MSC-1 118 server sends the BSSMAP Handover Command message 314 to the Serving BSS-1 114, which will trigger the BSS 114 to send the Handover Command message 316 to UE-1 102. When UE-1 102 is detected in the Target RNS, the Relocation Detect message 317 is sent to the Anchor MSC-1 118. According to this embodiment, the Relocation Detect message 317 is used as a trigger for the user plane data path switch in the BSS 114.

[0029] More specifically, upon the reception of the Relocation Detect message 317, the Anchor MSC-1 118 server according to an embodiment sends a LCLS status change message 318 re-using the LCLS-Status-Update message but with a new value in the LCLS-Status-Change-Request IE to the succeeding MSC server 208.

[0030] The far end MSC-2 server 208 requests BSS-2 114, via message 320, to switch DL user plane data path on purpose to start receiving user plane data from the Core Network 116 which originates from UE-1 102.

[0031] According to an embodiment, the message 320 does not explicitly request BSS-2 114 (and BSS-1 114) to break local switching, i.e. BSS-1/BSS-2 may continue to send user plane data locally. According to this embodiment, the break of local switching is initiated at reception of the Clear Command message in the old serving BSS-1 114, as described below.

[0032] As an alternative MSC-2 server 208 requests BSS-2 114 to break local switching and to start receiving user plane data DL from the Core Network 116 originating from UE-1 102, i.e. the message 320 will stop BSS-1 114 and BSS-2 114 from sending user plane data locally between UE-1 102 and UE-2 104. Normal Core Network switched user plane is now resumed at both ends. The message 320 sent from the MSC-2 server 208 to BSS-2 114 could be a completely new message or a re-use of the existing LCLS-Connect-Control message with a new value in the LCLS-Connection-Status-Control IE.

[0033] In the Relocation Complete message 322, the Target-RNS indicates to the MSC-1 server 118 in the LCLS-BSS-Status IE that the call is not possible to be locally switched. The MSC-1 server 118 requests the old serving BSS-1 114 to clear the old call leg via the Clear Command message 324. In the3GPP specification , the Clear Command message will also break the local switching, i.e. sending of user plane data locally between UE-1 and UE-2 is now stopped. However, as an alternative, the release of local switching can already be done at the reception of the new control message 320 in BSS-2, as described above.'

[0034] The Serving BSS-2 114 informs the MSC-2 server 208 that LCLS is broken via LCLS-Notification message 326. Clearing of the old call leg in the Serving BSS-1 113 is completed, as indicated by message 328. The Anchor MSC-1 server 118 informs succeeding Core Network nodes that LCLS is finally disconnected via message 330 and then data flows via the normally switched user plane 332 after the handover.

[0035] Thus, according to the foregoing embodiments and examples by, for example, using the Handover Detect message as a trigger for switching the DL user plane data path in the serving BSS (or other node) for the stationary mobile station (UE-2) during an inter-system handover or an inter-node handover to a node which does not supporting the LCLS feature, the break in the speech path between the mobile station (UE-1) now located in the target cell and the stationary mobile station (UE-2) will be minimized.

[0036] Figures 4 and 5 illustrate other embodiments and examples of the present method where an inter-BSS (Figure 4) or an inter-RAT (Figure 5) handover occurs where the LCLS connection is terminated. Both figure 4 and 5 contain some minor modifications to embodiments and examples illustrated in figures 2 and 3. In order to avoid repetition, only the additional signals in these embodiments and examples will be explained, since the remainin signaling in figures 4 and 5 is identical to the embodiments in figures 2 and 3.

[0037] In figure 4, it is shown that the LCLS-Status-Update message 310 transmitted by the anchor MSC 118 is acknowledged by the far-end MSC-2 server 208 by transmitting the LCLS-Status-Update-Ack message 310a after sending of user plane data UL via both the locally switched call connection and the core network path has begun and been acknowledged by the BSS-2 via the LCSL_CONNECT_CONTROL_Ack message 313.

[0038] Moreover, once the user plane path between the first user equipment UE-1 102 and the second user equipment UE-2 has been switched to the core network path 109 BSS-2 transmits a LCLS_CONNECT_CONTROL Ack message 222a back to the target MSC-1 208 informing the target MSC-2 208 that the call connection between the first and second user equipments UE-1 102 and UE-2 104 is locally switched with the LCLS configuration requested by the anchor MSC-1 118 in the LCLS-Status-Change-Request message 220, Thereafter, the anchor MSC-1 118 is the informed of the completion of the switching of the user plane path between the first and second user equipments UE-1 102 and UE-2 104 by transmitting an LCLS-Status-Change-Request Ack message 220a from the target MSC-2 208 to the anchor MSC-1 118. This message informs the MSC-1 118 that disconnection of the locally switched call connection between UE-1 102 and UE-2 104 is prepared and that the request for change of the locally switched call connection between the two user equipments UE-1 102 and UE-2 104 has been accepted.

[0039] In figure 5, the signals LCLS_CONNECT_CONTROL Ack message 320a and an LCLS-Status-Change-Request Ack message 318a are analogous to signals with reference numbers 222a and 220a mentioned in the previous paragraph and will thus not be explained again.

[0040] The foregoing methods and signaling schemes can be embodied in nodes or structures which are configured to perform the steps described in the above embodiments and examples. An exemplary BSS, eNodeB, MSC or other node 600 described above is generically illustrated in Figure 6. The node 600 can include a processor 602 connected to one or more communication interfaces 604. The processor 602 is configured to analyze and process signals received from the communications interface(s) 604 and to transmit messages or signals using the communications interface, e.g., as described above with respect to Figures 2, 3, 4 and 5. If the node 600 includes air interface capability, e.g., if node 600 is or includes base station functionality, then the node 600 includes one or more antennas (not shown) connected to processor 600 via a transceiver. The processor 600 may also be connected to one or more memory device 606 in which software code or program instructions can be stored for execution by the processor 600 to, for example, generate the messages described above.

REFERENCES CITED IN THE DESCRIPTION

Non-patent literature cited in the description

- 3rd Generation Partnership Project3GPP TS 23.284, 2011, [0004]

Patentkrav

1. Fremgangsmåde i en kernenetværksknude (118) til håndtering af lokalt omskiftede opkaldsforbindelser i et trådløst kommunikationsnetværk, omfattende trinnene med at:
- modtage en første besked (218, 317), der angiver, at en første brugerindretning (102), der er forbundet via den lokalt omskiftede opkaldsforbindelse, er blevet detekteret i et målbasisstation-subsystem, BSS (203);
- transmittere, udløst af den første besked (218, 317), en local call local switching-statusændringsanmodning, LCLS-Status-Change-Request (220, 318), der anmoder om en statusændring af den lokalt omskiftede opkaldsforbindelse til en anden brugerindretning (104), hvor LCLS-Status-Change-Request-beskeden omfatter en værdi i sit informationselement, IE, hvor værdien er "angiv DL-data efter handover", der angiver modtagelse af brugerplan-downlinkdata, som stammer fra den første brugerindretning (102), ved den anden brugerindretning (104) via en omskiftet kernenetværksvej (109), således at en brugerplansdatavej (100) fra den første brugerindretning (102) til den anden brugerindretning (104) omskiftes til kernenetværksvejen (109);
- modtage, ved kernenetværksknuden (118) fra mål-BSS (203), en fjerde besked (224, 322), der angiver, at den første brugerindretning (102) har fuldført en handover, og at opkaldsforbindelsen mellem den overdragede første brugerindretning (102) og den anden brugerindretning (104) ikke kan omskiftes lokalt;
- transmittere til et kildebasisstation-subsystem (114), som reaktion på den fjerde besked (224, 322), en femte besked (226, 324), der instruerer om, at sletningen af den lokalt omskiftede opkaldsforbindelse mellem den første brugerindretning (102) og den anden brugerindretning (104) efter handover af den første brugerindretning (102) er fuldført.

2. Fremgangsmåde ifølge krav 1, endvidere omfattende trinnet med at modtage, ved kerne netværksknuden (118), en tredje besked (220a, 318a) som reaktion på nævnte LCLS-Status-Change-Request (220, 318), der angiver, at omskiftning af brugerplansdatavejen (100) til kernenetværksvejen (109) er fuldført.

3. Fremgangsmåde ifølge et af kravene 1-2, hvor den første besked omfatter en Handover Detect, HO detect, -besked (218).

4. Fremgangsmåde ifølge et af kravene 1-2, hvor den første besked omfatter en Relocation Detect-besked (317).

5. Fremgangsmåde ifølge et af kravene 1-4, hvor den fjerde besked omfatter en Handover Complete, HO Complete, -besked (224).

6. Fremgangsmåde ifølge et af kravene 1-4, hvor den fjerde besked omfatter en Relocation Complete-besked (322).

7. Fremgangsmåde ifølge et af kravene 1-6, hvor den femte besked omfatter en Clear Command-besked (226, 324).

8. Fremgangsmåde ifølge et af kravene 1-7, hvor kernenetværksknuden (118) omfatter et mobilt omskiftningscentrum (MSC).

9. Fremgangsmåde ifølge et af kravene 1-8, hvor den lokalt omskiftede opkaldsforbindelse omfatter en data- eller stemmeforbindelsesforbindelse mellem to brugerindretninger, der betjenes af mindst en netværksknude, hvor opkaldsforbindelsen omskiftes lokalt i en yderligere netværksknude, der styrer den mindst ene netværksknude.

10. Kernenetværksknude (600), der er indrettet til et trådløst kommunikationsnetværk, omfattende:
- en kommunikationsgrænseflade (604), der er indrettet til modtagelse og transmission af data og styreinformation i det trådløse kommunikationsnetværk,
- en processor (602), der er konfigureret til at analysere og behandle signaler, der modtages fra kommunikationsgrænsefladen (604), hvor signalerne omfatter en første besked (218, 317), der angiver, at en første brugerindretning (102), der er forbundet via en lokalt omskiftet opkaldsforbindelse, er blevet detekteret i et målbasisstation-subsystem (203), og en fjerde besked (224, 322), der angiver, at den første brugerindretning (102) har fuldført handover'en til målbasisstation-subsystemet (203), hvor processoren (602) end-

videre er konfigureret til at generere en femte besked (226, 324) som reaktion på den fjerde besked (224, 322), der blev modtaget fra kommunikationsgrænsefladen (604), hvor den femte (226, 324) besked instruerer om at slette den lokalt omskiftede opkaldsforbindelse mellem den første brugerindretning (102) og den anden brugerindretning (104) efter vellykket handover af den første brugerindretning (102) til målbasisstation-subsystemet (203) og at transmittere den femte besked (226, 324) til et kildebasisstation-subsystem (114) via kommunikationsgrænsefladen (604);

- en hukommelsesindretning (606) til lagring af softwarekode, der er indrettet til at generere beskeder, der transmitteres af processoren (602) via det trådløse kommunikationsnetværk,

kendetegnet ved, at

processoren (602) endvidere er konfigureret til at generere en local call local switching-statusændringsanmodning, LCLS-Status-Change-Request (220, 318) som reaktion på den modtagne første besked (218, 317) og transmittere nævnte LCLS-Status-Change-Request (220, 318) via kommunikationsgrænsefladen (604), der anmoder om en statusændring af den lokalt omskiftede forbindelse til den anden brugerindretning (104), hvor LCLS-Status-Change Request-beskeden omfatter en værdi i sit informationselement, IE, hvor værdien er "angiv DL-data efter handover", der angiver modtagelse af brugerplan-downlinkdata, som stammer fra den første brugerindretning (102), ved den anden brugerindretning (104) via en omskiftet kernenetværksvej (109), således at en brugerplansdatavej (100) fra den første brugerindretning (102) til den anden brugerindretning (104) omskiftes til kernenetværksvejen (109) for at modtage brugerplansdata, der stammer fra den første brugerindretning (102), via kernenetværksvejen (109).

DRAWINGS

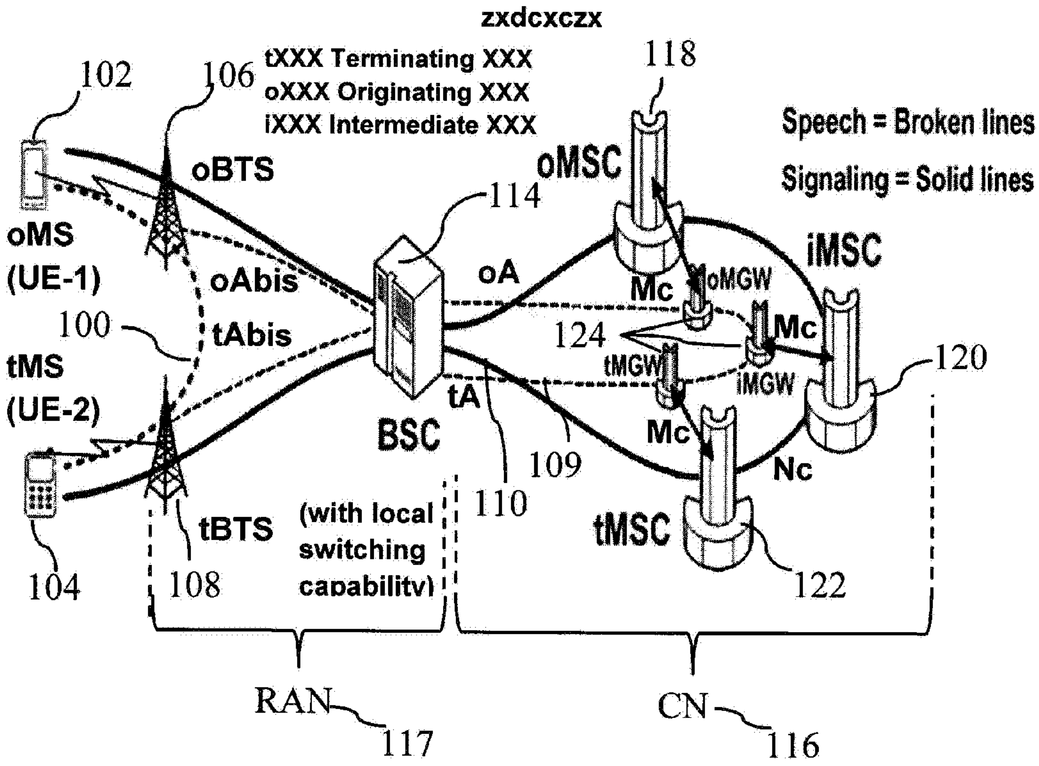

Fig. 1

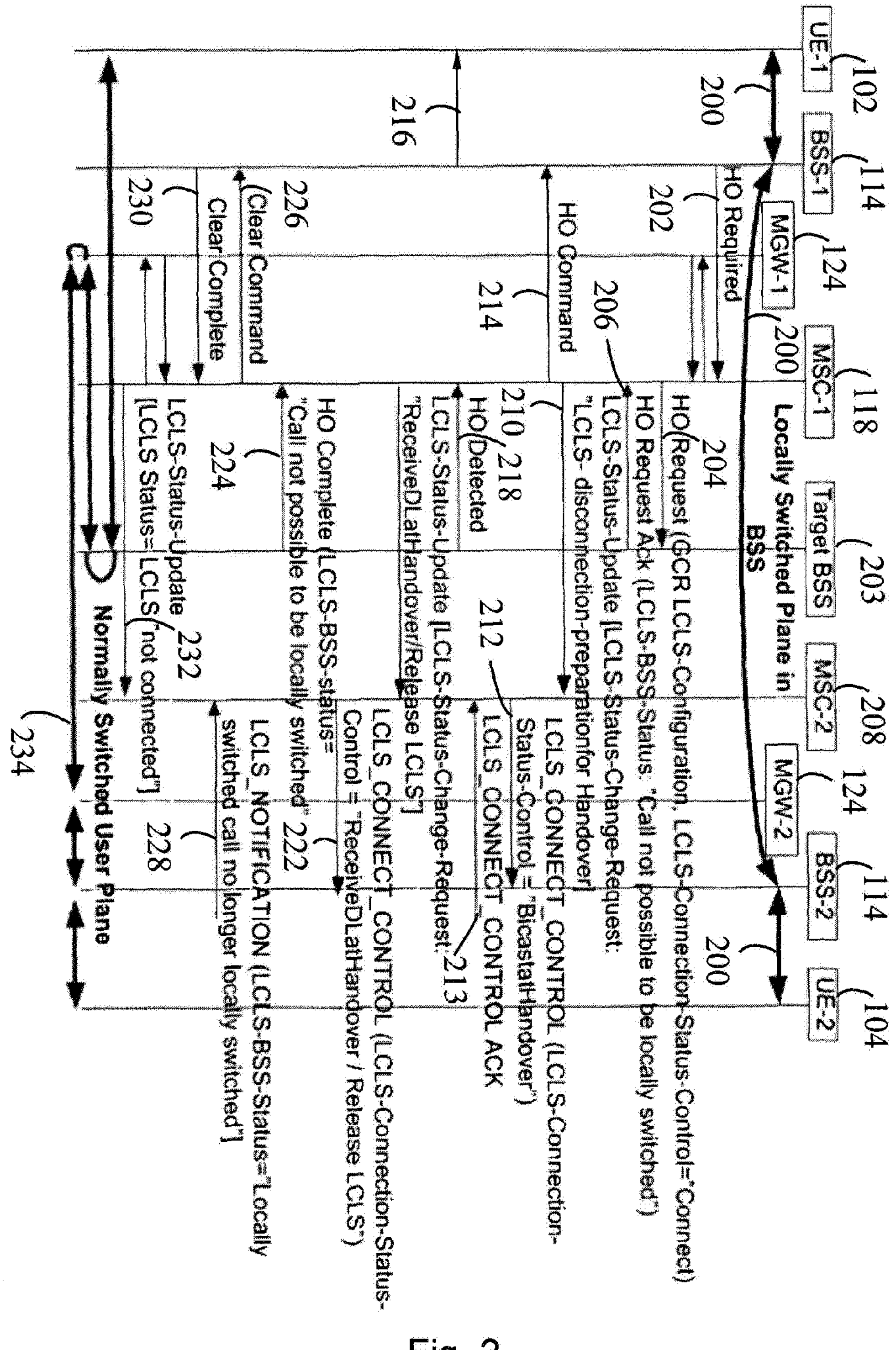
UE-1
102
BSS-1
114
MGW-1
124
MSC-1
118
Target BSS
203
MSC-2
208
MGW-2
124
BSS-2
114
UE-2
104
200
Locally Switched Plane in BSS
HO Required
202
206
204
HO Request (GCR LCLS-Configuration, LCLS-Connection-Status-Control="Connect)
HO Request Ack (LCLS-BSS-Status: "Call not possible to be locally switched")
LCLS-Status-Update [LCLS-Status-Change-Request: "LCLS- disconnection-preparationfor Handover]
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "BicastatHandover")
212
LCLS_CONNECT_CONTROL ACK
213
210
218
HO Detected
LCLS-Status-Update [LCLS-Status-Change-Request: "ReceiveDLatHandover/Release LCLS"]
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "ReceiveDLatHandover / Release LCLS")
HO Command
214
216
HO Complete (LCLS-BSS-status= "Call not possible to be locally switched"
222
Clear Command
226
Clear Complete
230
LCLS-Status-Update [LCLS Status= LCLS "not connected"]
224
232
LCLS_NOTIFICATION (LCLS-BSS-Status="Locally switched call no longer locally switched")
228
Normally Switched User Plane
234

Fig. 2

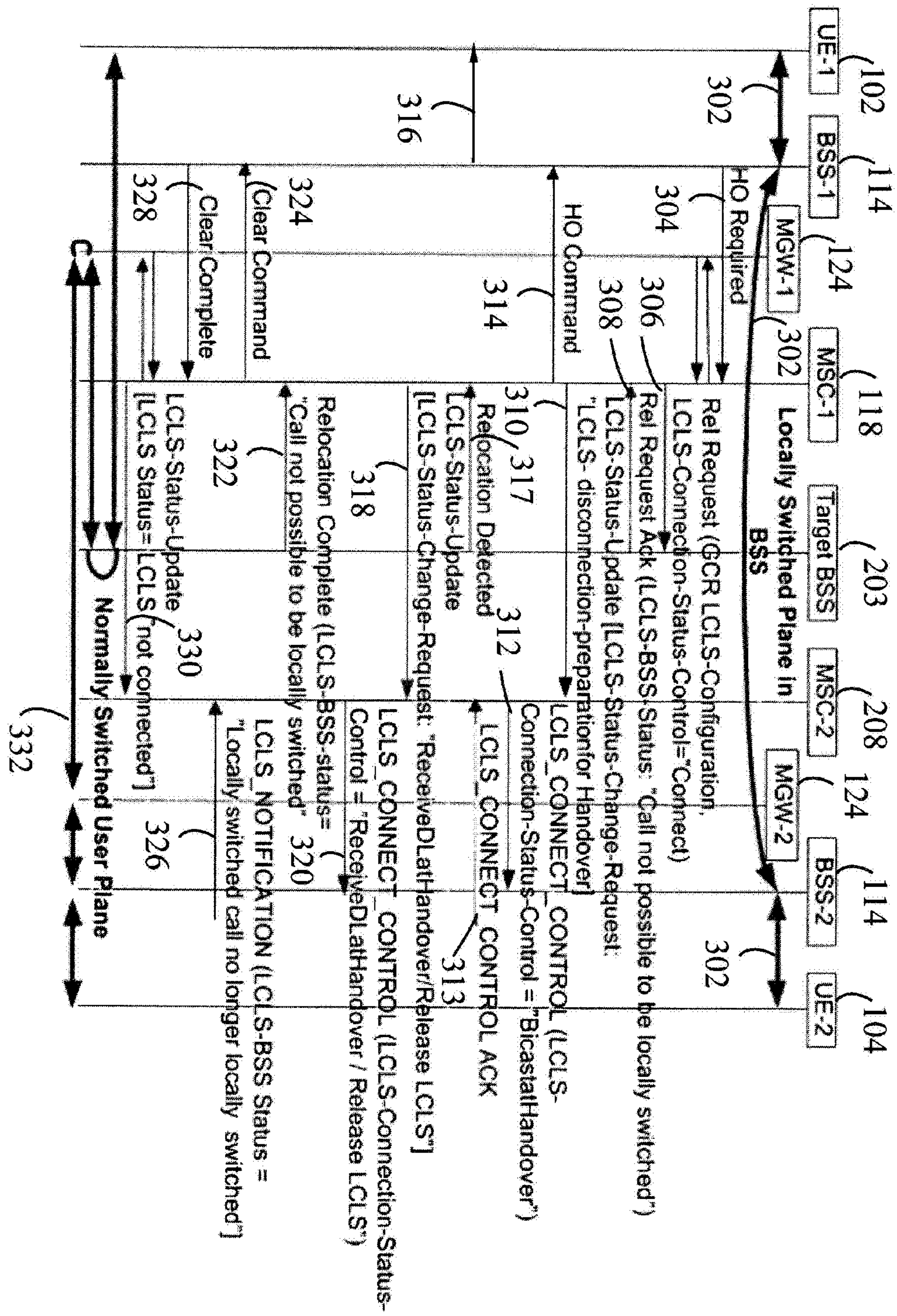
UE-1
102
BSS-1
114
MGW-1
124
MSC-1
118
Target BSS
203
MSC-2
208
MGW-2
124
BSS-2
114
UE-2
104
302
Locally Switched Plane in BSS
HO Required
304
306
308
Rel Request (GCR LCLS-Configuration, LCLS-Connection-Status-Control="Connect)
Rel Request Ack (LCLS-BSS-Status: "Call not possible to be locally switched")
LCLS-Status-Update [LCLS-Status-Change-Request: "LCLS- disconnection-preparationfor Handover]
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "BicastatHandover")
312
LCLS_CONNECT_CONTROL ACK
313
HO Command
314
310
317
Relocation Detected
LCLS-Status-Update [LCLS-Status-Change-Request: "ReceiveDLatHandover/Release LCLS"]
318
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "ReceiveDLatHandover / Release LCLS")
316
Relocation Complete (LCLS-BSS-status= "Call not possible to be locally switched" 320
324
Clear Command
LCLS_NOTIFICATION (LCLS-BSS Status = "Locally switched call no longer locally switched"]
326
322
Clear Complete
328
LCLS-Status-Update [LCLS Status= LCLS (not connected"]
330
Normally Switched User Plane
332

Fig. 3

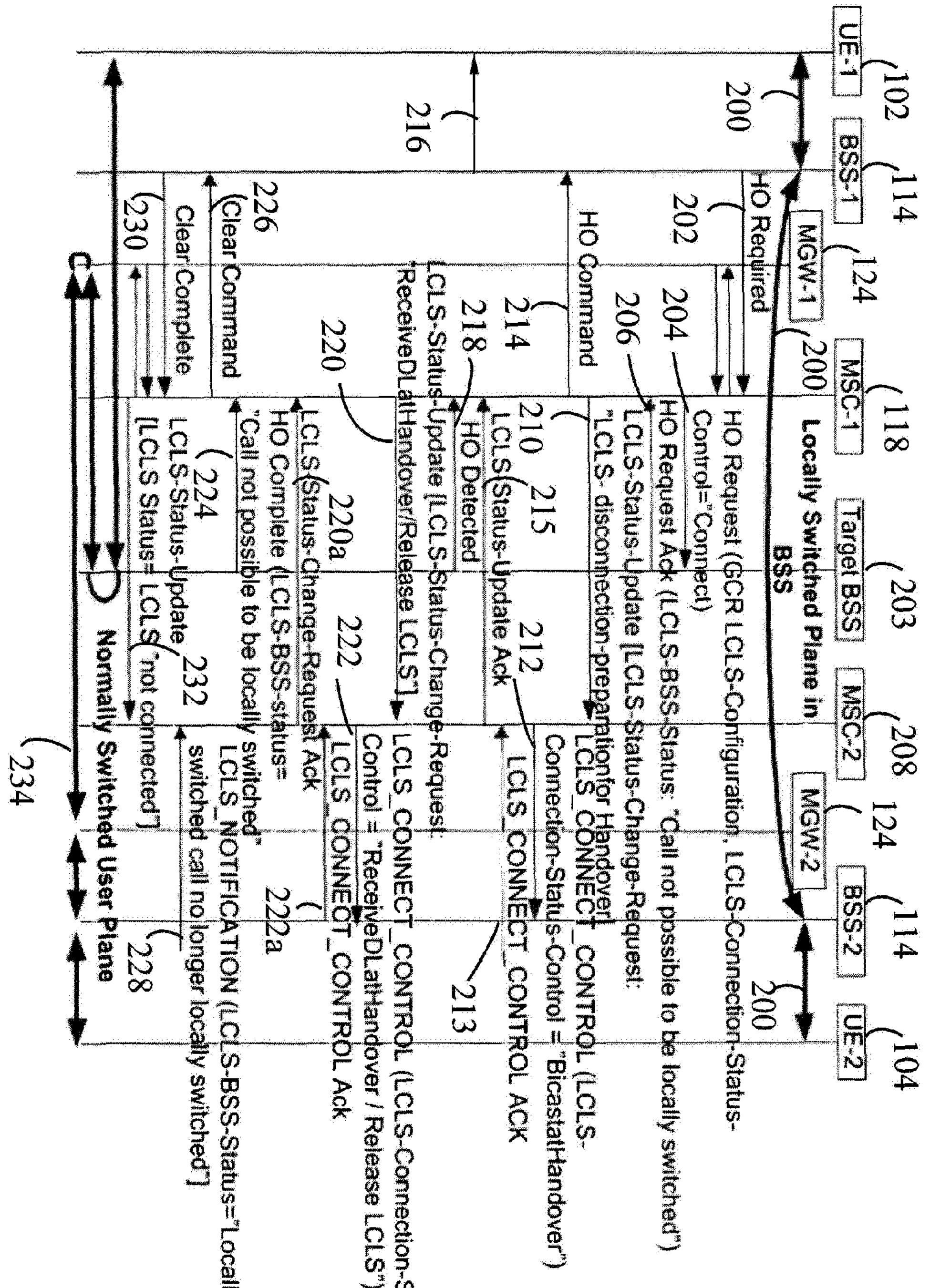
UE-1
BSS-1
MGW-1
MSC-1
Target BSS
MSC-2
MGW-2
BSS-2
UE-2
102
114
124
118
203
208
124
114
104
Locally Switched Plane in BSS
200
HO Required
202
HO Request (GCR LCLS-Configuration, LCLS-Connection-Status-Control="Connect)
204
HO Request Ack (LCLS-BSS-Status: "Call not possible to be locally switched")
206
LCLS-Status-Update [LCLS-Status-Change-Request: "LCLS- disconnection-preparationfor Handover"]
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "BicastatHandover")
213
LCLS_CONNECT_CONTROL ACK
210
215
LCLS-Status-Update Ack
212
HO Command
214
HO Detected
218
LCLS-Status-Update [LCLS-Status-Change-Request: "ReceiveDLatHandover/Release LCLS"]
220
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "ReceiveDLatHandover / Release LCLS")
222
LCLS_CONNECT_CONTROL Ack
222a
216
LCLS-Status-Change-Request Ack
220a
HO Complete (LCLS-BSS-status= "Call not possible to be locally switched"
LCLS_NOTIFICATION (LCLS-BSS-Status="Locally switched call no longer locally switched")
228
226
Clear Command
Clear Complete
230
LCLS-Status-Update [LCLS Status= LCLS "not connected"]
224
232
Normally Switched User Plane
234

Fig. 4

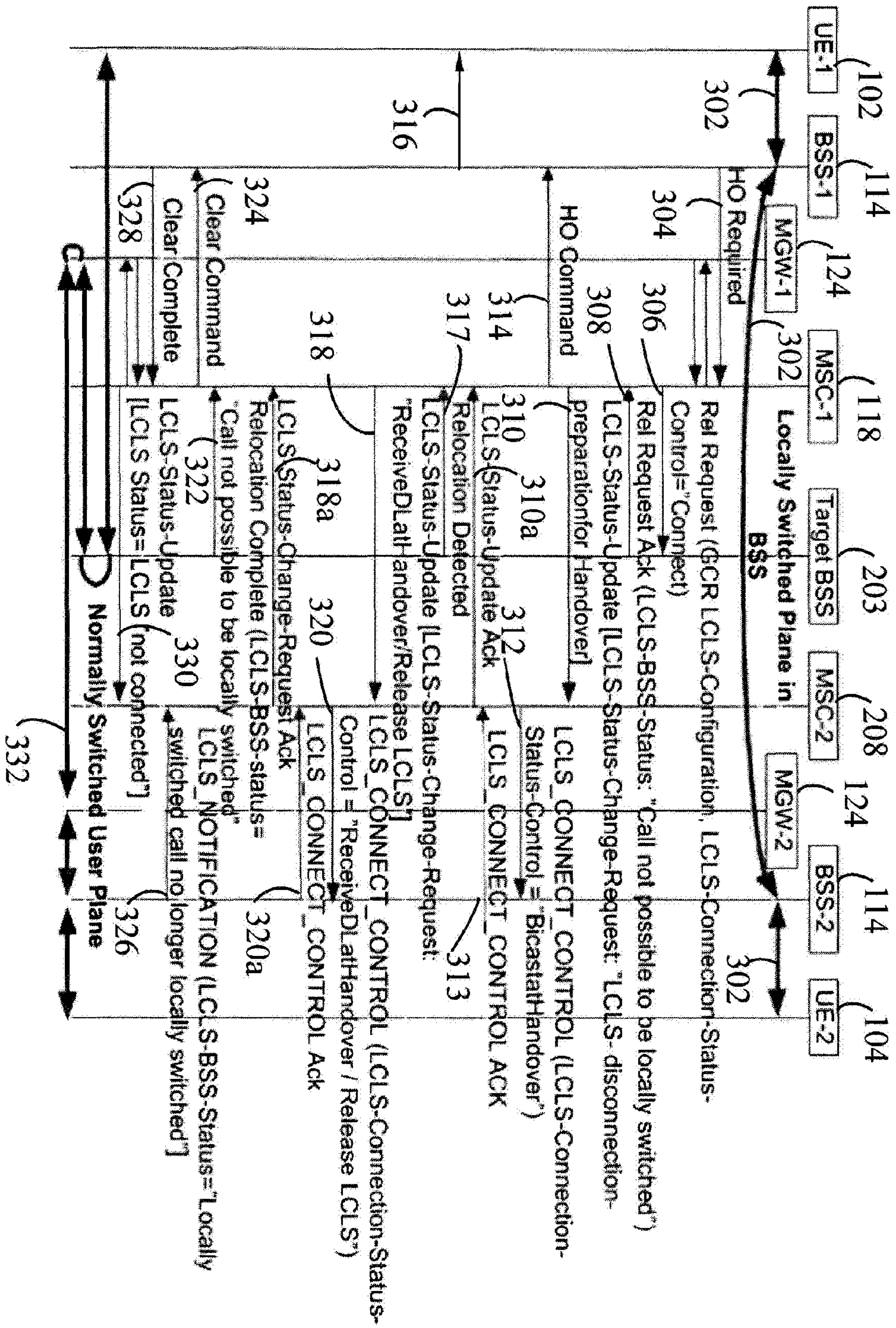
UE-1
BSS-1
MGW-1
MSC-1
Target BSS
MSC-2
MGW-2
BSS-2
UE-2
Locally Switched Plane in BSS
HO Required
Rel Request (GCR LCLS-Configuration, LCLS-Connection-Status-Control="Connect)
Rel Request Ack (LCLS-BSS-Status: "Call not possible to be locally switched")
LCLS-Status-Update [LCLS-Status-Change-Request: "LCLS-disconnection-preparationfor Handover]
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "BicastatHandover")
LCLS_CONNECT_CONTROL ACK
LCLS-Status-Update Ack
Relocation Detected
HO Command
LCLS-Status-Update [LCLS-Status-Change-Request: "ReceiveDLatHandover/Release LCLS"]
LCLS_CONNECT_CONTROL (LCLS-Connection-Status-Control = "ReceiveDLatHandover / Release LCLS")
LCLS_CONNECT_CONTROL Ack
LCLS-Status-Change-Request Ack
Relocation Complete (LCLS-BSS-status= "Call not possible to be locally switched"
LCLS_NOTIFICATION (LCLS-BSS-Status="Locally switched call no longer locally switched")
Clear Command
Clear Complete
LCLS-Status-Update [LCLS Status=LCLS (not connected")]
Normally Switched User Plane
102
114
124
118
203
208
104
302
304
306
308
310
310a
312
313
314
316
317
318
318a
320
320a
322
324
326
328
330
332

Fig. 5

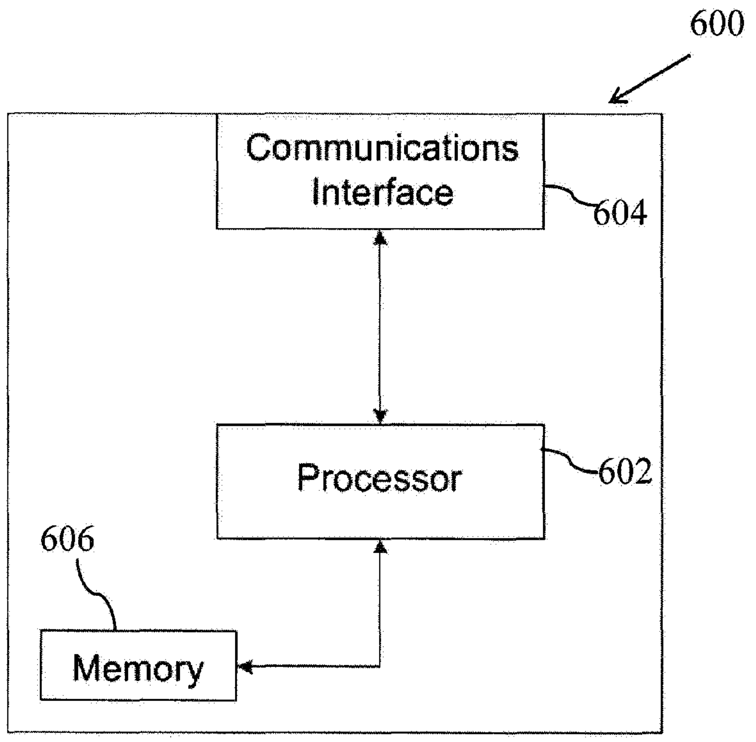
600
Communications Interface
604
Processor
602
606
Memory

Fig. 6