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(54) Title: SYSTEM AND METHOD FOR HANDLING REDIRECTION OF USER EQUIPMENT IN A COMMUNICATION SYSTEM

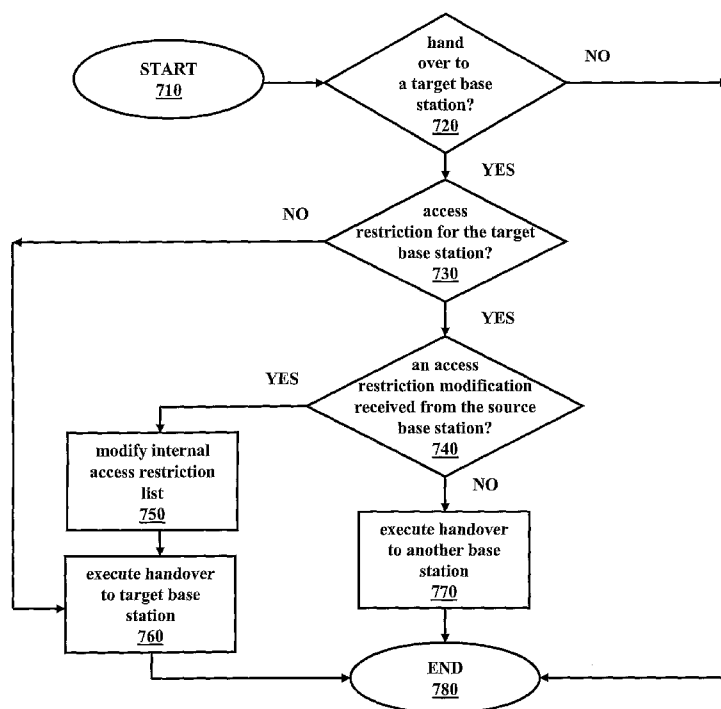


FIGURE 7

(57) Abstract: An apparatus, method and system for providing management and execution of handover or redirection of user equipment with an access restriction. In one embodiment, an apparatus includes a processor (520) and memory (550) including computer program code. The memory (550) and the computer program code are configured to, with the processor (520), cause the apparatus to modify an internal access restriction list of a user equipment with respect to an access restriction for a redirection thereof, and execute the redirection.



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SYSTEM AND METHOD FOR HANDLING REDIRECTION OF USER EQUIPMENT IN A COMMUNICATION SYSTEM

TECHNICAL FIELD

The present invention is directed, in general, to communication systems and, in particular, to a system and method to provide handover or redirection of a user equipment with an access restriction in a communication system.

BACKGROUND

Long term evolution (“LTE”) of the Third Generation Partnership Project (“3GPP”), also referred to as 3GPP LTE, refers to research and development involving the 3GPP Release 8 and beyond, which is the name generally used to describe an ongoing effort across the industry aimed at identifying technologies and capabilities that can improve systems such as the universal mobile telecommunication system (“UMTS”). The goals of this broadly based project include improving communication efficiency, lowering costs, improving services, making use of new spectrum opportunities, and achieving better integration with other open standards. The 3GPP LTE project is not itself a standard-generating effort, but will result in new recommendations for standards for the UMTS.

The evolved UMTS terrestrial radio access network (“E-UTRAN”) in 3GPP includes base stations providing user plane (including packet data convergence protocol/radio link control/medium access control/physical (“PDCP/RLC/MAC/PHY”) sublayers) and control plane (including radio resource control (“RRC”) sublayer) protocol terminations towards wireless communication devices such as cellular telephones. A wireless communication device or terminal is generally known as user equipment (“UE”). A base station is an entity of a communication network often referred to as a Node B or an NB. Particularly in the E-UTRAN, an “evolved” base station is referred to as an eNodeB. For details about the overall architecture of the E-UTRAN, see 3GPP Technical Specification (“TS”) 36.300, v8.5.0 (2008-05), which is incorporated herein by reference.

As wireless communication systems such as cellular telephone, satellite, and microwave communication systems become widely deployed and continue to attract a growing number of users, there is a pressing need to accommodate a large and variable number of communication devices transmitting a growing range of communication applications with fixed communication resources. An area of incomplete development in such wireless communication systems relates to handover of a mobile station (*i.e.*, user equipment) from one base station to a second base station

when the second base station is operating with an access restriction for the user equipment that may prevent completion of the handover.

It has been proposed in the 3GPP to enable a connection release of user equipment with redirection (*i.e.*, redirecting the user equipment connection to a carrier frequency and/or radio access technology (“RAT”)), which was previously barred or restricted due to an access restriction. In the current 3GPP Release 8 specification, the communication network may order handover of the user equipment to a restricted cell, for example, a cell not included in the user equipment’s allowed closed subscriber group (“CSG”) list. The user equipment generally assumes that the communication network has already checked access restrictions and rights and the user equipment is therefore not prepared, for example, for a tracking area update (“TAU”) rejection during a handover process. A tracking area update is a procedure run by the mobility management entity (“MME”) and triggered by user equipment when the user equipment enters a cell in a new tracking area.

Access restriction lists (*e.g.*, a list of forbidden location areas for roaming or an allowed closed subscriber group list), are typically kept by a non-access stratum (“NAS”) of a communication system that handles the necessary bookkeeping for access restriction lists. Based on these lists, the access stratum (“AS”) controls a 300-second timer running therein. The 300-second timer prevents the user equipment from performing multiple reselections to a given cell on a frequency or a frequency that is located in an area restricted from the user equipment and as such is listed in an access restriction list(s). The non-access stratum, however, only removes an entry from a restricted list due to specific actions such as a timer expiration or signaling events. Details are provided in 3GPP TS 24.008 4.2.19.0 (2004-06), which is incorporated herein by reference.

The aforementioned procedure has limitations. The user equipment will have difficulty finding a suitable cell because this includes verifying that the target cell is part of at least one tracking area (“TA”) that is not part of a list of forbidden tracking areas for roaming, which typically belongs to or is maintained by a public land mobile network (“PLMN”). The target location area (“LA”) would also have to be removed from a list of restricted tracking areas or otherwise identified as not being on the non-access stratum’s access restriction list in order to enable the aforementioned handover process or redirection to work.

As will become more apparent, a functional and repeatable process to manage a handover or redirection of the user equipment to a target cell with an access restriction is not known for handling connected-mode mobility to or between closed subscriber group cells or other restricted cells/frequencies/area. Similar limitations and restrictions are also present in legacy systems such as UMTS terrestrial radio access (“UTRA”) and Global System for Mobile communications

("GSM") based systems for redirection of the user equipment to a target cell with an access restriction for the user equipment.

In view of the growing deployment of communication systems such as cellular communication systems, further improvements are necessary for efficient management of handover or redirection of the user equipment with an access restriction. Therefore, what is needed in the art is a system and method that avoid the deficiencies of known communication systems for management and execution of such handovers or redirections with access restrictions.

SUMMARY OF THE INVENTION

These and other problems are generally solved or circumvented, and technical advantages are generally achieved, by embodiments of the present invention, which include an apparatus, method and system for providing management and execution of handover or redirection of user equipment with an access restriction. In one embodiment, an apparatus includes a processor and memory including computer program code. The memory and the computer program code are configured to, with the processor, cause the apparatus to modify an internal access restriction list of a user equipment with respect to an access restriction for a redirection thereof, and execute the redirection.

The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter, which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures or processes for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawing, in which:

FIGUREs 1 and 2 illustrate system level diagrams of embodiments of communication systems including a base station and wireless communication devices that provide an environment for application of the principles of the present invention;

FIGURES 3 and 4 illustrate system level diagrams of embodiments of communication systems including a wireless communication systems that provide an environment for application of the principles of the present invention;

FIGURE 5 illustrates a system level diagram of an embodiment of a communication element of a communication system for application of the principles of the present invention;

FIGURE 6 illustrates an exemplary sequence of operations performed at a base station to handover a user equipment to a target base station including an access restriction for the user equipment according to the principles of the present invention;

FIGURE 7 illustrates an exemplary sequence of operations performed at the user equipment for handover to a target base station when an access restriction for the user equipment at the target base station is operative according to the principles of the present invention;

FIGURE 8 illustrates an exemplary sequence of operations performed at a base station to redirect user equipment including an access restriction for the user equipment according to the principles of the present invention; and

FIGURE 9 illustrates an exemplary sequence of operations performed at user equipment for a redirection of the user equipment when an access restriction for the user equipment is operative according to the principles of the present invention.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

The making and using of the presently preferred embodiments are discussed in detail below. It should be appreciated, however, that the present invention provides many applicable inventive concepts that can be embodied in a wide variety of specific contexts. The specific embodiments discussed are merely illustrative of specific ways to make and use the invention, and do not limit the scope of the invention. In view of the foregoing, the present invention will be described with respect to exemplary embodiments in a specific context of a system and method for management and execution of handover of user equipment to a target cell with an access restriction.

As currently discussed in 3GPP working groups, a radio resource control Connection_Release message includes redirected carrier information. The redirected carrier information indicates a carrier frequency that may be in a frequency division duplex ("FDD") or time division duplex ("TDD") downlink that is used to redirect the user equipment to another E-UTRAN or to another inter-RAT carrier frequency by means of cell selection upon leaving an RRC_CONNECTED state, as specified in 3GPP TS 36.304 v. 8.4.0, (2008-12), which is incorporated herein by reference. The 3GPP TS 36.304 indicates that on a transition from an RRC_CONNECTED state to an RRC_IDLE state, the user equipment will attempt to camp on the

last cell for which it was in an RRC_CONNECTED state, or on any cell on a frequency that may be radio access technology assigned by the radio resource control in a State Transition message. If no suitable cell is found, the user equipment performs cell selection using a Stored Information Cell Selection procedure in order to find a suitable cell to camp on.

The handover or redirection of the user equipment to a target cell in a closed subscriber group that is not included in the closed subscriber group's allowed list of user equipment will not succeed due to restrictions in 3GPP TS 36.331 v. 8.5.0 (2009-03), which is incorporated herein by reference, under a topic therein related to "CSG Indication." If a flag for CSG Indication is set to TRUE, the user equipment is only allowed to access the target cell if the closed subscriber group identity ("CSG ID") matches an entry in a "white list" stored in the user equipment. Access is otherwise barred if the CSG ID is not in the user equipment's allowed closed subscriber group list.

If user equipment access to a target cell is barred because the CSG ID is not in the user equipment's allowed closed subscriber group list, a tracking area updating procedure will not be started. The user equipment stays in the current serving cell and must perform a normal cell reselection process. A tracking area updating procedure is started as soon as possible and, if still necessary, the user equipment moves to a target cell where its access is allowed.

Thus, if the user equipment in an RRC_Connected state is signaled with a handover or an RRC Reconfiguration message to transition to a target cell, the user equipment expects that the target cell will be accessible. The user equipment expects that access rights have already been checked and verified by mobile management entity prior to execution of the handover. If this is not the case, the process described above to manage a handover of the user equipment to a target cell with an access restriction is not functional. For an RRC_Connection_Release including redirection information, the user equipment will not be able to access the indicated target given in the redirection information element ("IE") if this target is listed in an access restriction list. Before providing solutions to the aforementioned limitations, exemplary communication systems that provide environments for the application of the principles of the present invention will hereinafter be introduced.

Referring initially to FIGURE 1, illustrated is a system level diagram of an embodiment of a communication system including a base station 115 and wireless communication devices (e.g., user equipment) 135, 140, 145 that provides an environment for application of the principles of the present invention. The base station 115 is coupled to a public switched telephone network (not shown). The base station 115 is configured with a plurality of antennas to transmit and receive signals in a plurality of sectors including a first sector 120, a second sector 125, and a third sector 130, each of which typically spans 120 degrees. The sectors are formed by focusing and phasing the radiated and received signals from the base station antennas. The plurality of

sectors increases the number of subscriber stations (*e.g.*, the wireless communication devices 135, 140, 145) that can simultaneously communicate with the base station 115 without the need to increase the utilized bandwidth by reduction of interference that results from focusing and phasing base station antennas. The radiated and received frequencies utilized by the communication system illustrated in FIGURE 1 would typically be two gigahertz to provide non-line-of-sight communication.

Turning now to FIGURE 2, illustrated is a system level diagram of an embodiment of a communication system including wireless communication devices that provides an environment for application of the principles of the present invention. The communication system includes a base station 210 coupled by communication path or link 220 (*e.g.*, by a fiber-optic communication path) to a core telecommunications network such as public switched telephone network ("PSTN") 230. The base station 210 is coupled by wireless communication paths or links 240, 250 to wireless communication devices 260, 270, respectively, that lie within its cellular area 290.

In operation of the communication system illustrated in FIGURE 2, the base station 210 communicates with each wireless communication device 260, 270 through control and data communication resources allocated by the base station 210 over the communication paths 240, 250, respectively. The control and data communication resources may include frequency and time-slot communication resources in frequency division duplex ("FDD") and/or time division duplex ("TDD") communication modes.

Turning now to FIGURE 3, illustrated is a system level diagram of an embodiment of a communication system including a wireless communication system that provides an environment for the application of the principles of the present invention. The wireless communication system may be configured to provide evolved UMTS terrestrial radio access network ("E-UTRAN") universal mobile telecommunications services. A mobile management entity/system architecture evolution gateway ("MME/SAE GW," one of which is designated 310) provides control functionality for an E-UTRAN node B (designated "eNB," an "evolved node B," also referred to as a "base station," one of which is designated 320) via an S1 communication link (ones of which are designated "S1 link"). The base stations 320 communicate via X2 communication links (ones of which are designated "X2 link"). The various communication links are typically fiber, microwave, or other high-frequency metallic communication paths such as coaxial links, or combinations thereof.

The base stations 320 communicate with user equipment ("UE," ones of which are designated 330), which is typically a mobile transceiver carried by a user. Thus, communication links (designated "Uu" communication links, ones of which are designated "Uu link") coupling

the base stations 320 to the user equipment 330 are air links employing a wireless communication signal such as, for example, an orthogonal frequency division multiplex ("OFDM") signal.

Turning now to FIGURE 4, illustrated is a system level diagram of an embodiment of a communication system including a wireless communication system that provides an environment for the application of the principles of the present invention. The wireless communication system provides an E-UTRAN architecture including base stations (one of which is designated 410) providing E-UTRAN user plane (packet data convergence protocol/radio link control/media access control/physical) and control plane (radio resource control) protocol terminations towards user equipment 420. The base stations 410 are interconnected with X2 interfaces or communication links (designated "X2"). The base stations 410 are also connected by S1 interfaces or communication links (designated "S1") to an evolved packet core ("EPC") including a mobile management entity/system architecture evolution gateway ("MME/SAE GW," one of which is designated 430). The S1 interface supports a multiple entity relationship between the mobile management entity/system architecture evolution gateway 430 and the base stations 410. For applications supporting inter-public land mobile handover, inter-eNB active mode mobility is supported by the mobile management entity/system architecture evolution gateway 430 relocation via the S1 interface.

The base stations 410 may host functions such as radio resource management. For instance, the base stations 410 may perform functions such as internet protocol ("IP") header compression and encryption of user data streams, ciphering of user data streams, radio bearer control, radio admission control, connection mobility control, dynamic allocation of resources to user equipment in both the uplink and the downlink, selection of a mobility management entity at the user equipment attachment, routing of user plane data towards the user plane entity, scheduling and transmission of paging messages (originated from the mobility management entity), scheduling and transmission of broadcast information (originated from the mobility management entity or operations and maintenance), and measurement and reporting configuration for mobility and scheduling. The mobile management entity/system architecture evolution gateway 430 may host functions such as distribution of paging messages to the base stations 410, security control, termination of U-plane packets for paging reasons, switching of U-plane for support of the user equipment mobility, idle state mobility control, and system architecture evolution bearer control. The user equipment 420 receives an allocation of a group of information blocks from the base stations 410.

Turning now to FIGURE 5, illustrated is a system level diagram of an embodiment of a communication element 510 of a communication system for application of the principles of the present invention. The communication element or device 510 may represent, without limitation, a

base station, a wireless communication device (*e.g.*, a subscriber station, terminal, mobile station, a user equipment), a network control element, a communication node, or the like. The communication element 510 includes, at least, a processor 520, memory 550 that stores programs and data of a temporary or more permanent nature, an antenna(s) 560, and a radio frequency transceiver 570 coupled to the antenna(s) 560 and the processor 520 for bidirectional wireless communication. The communication element 510 may provide point-to-point and/or point-to-multipoint communication services.

The communication element 510, such as a base station in a cellular network, may be coupled to a communication network element, such as a network control element 580 of a public switched telecommunication network ("PSTN"). The network control element 580 may, in turn, be formed with a processor, memory, and other electronic elements (not shown). The network control element 580 generally provides access to a telecommunication network such as a PSTN. Access may be provided using fiber optic, coaxial, twisted pair, microwave communication, or similar link coupled to an appropriate link-terminating element. A communication element 510 formed as a wireless communication device is generally a self-contained device intended to be carried by an end user.

The processor 520 in the communication element 510, which may be implemented with one or a plurality of processing devices, performs functions associated with its operation including, without limitation, encoding and decoding (encoder/decoder 523) of individual bits forming a communication message, formatting of information, and overall control (controller 525) of the communication element, including processes related to management of resources (resource manager 528). Exemplary functions related to management of resources include, without limitation, hardware installation, traffic management, performance data analysis, tracking of end users and equipment, configuration management, end user administration, management of wireless communication devices, management of tariffs, subscriptions, security, billing and the like. For instance, in accordance with the memory 550, the resource manager 528 is configured to allocate time and frequency communication resources for transmission of data to/from a communication device and format messages including the communication resources therefor. The processor 520 further includes processes to manage a handover of a wireless communication device from a source base station to a target base station.

The execution of all or portions of particular functions or processes related to management of resources may be performed in equipment separate from and/or coupled to the communication element 510, with the results of such functions or processes communicated for execution to the communication element 510. The processor 520 of the communication element 510 may be of any type suitable to the local application environment, and may include one or

more of general-purpose computers, special purpose computers, microprocessors, digital signal processors (“DSPs”), field-programmable gate arrays (“FPGAs”), application-specific integrated circuits (“ASICs”), and processors based on a multi-core processor architecture, as non-limiting examples.

The transceiver 570 of the communication element 510 modulates information onto a carrier waveform for transmission by the communication element 510 via the antenna 560 to another communication element. The transceiver 570 demodulates information received via the antenna 560 for further processing by other communication elements.

The memory 550 of the communication element 510, as introduced above, may be one or more memories and of any type suitable to the local application environment, and may be implemented using any suitable volatile or nonvolatile data storage technology such as a semiconductor-based memory device, a magnetic memory device and system, an optical memory device and system, fixed memory, and removable memory. The programs stored in the memory 550 may include program instructions or computer program code that, when executed by an associated processor, enable the communication element 510 to perform tasks as described herein. Of course, the memory 550 may form a data buffer for data transmitted to and from the communication element 510. Exemplary embodiments of the system, subsystems, and modules as described herein may be implemented, at least in part, by computer software executable by processors of, for instance, the wireless communication device and the base station, or by hardware, or by combinations thereof. As will become more apparent, systems, subsystems and modules may be embodied in the communication element 510 as illustrated and described herein.

As introduced herein, a communication element (*e.g.*, a base station) 510 includes information in mobility control message information (*e.g.*, in handover) reconfiguration, or RRC_Connection_Release messages, which enables the network to control or change a wireless communication device (*e.g.*, user equipment) access rights and restrictions related to a particular target cell. The information may include closed subscriber group or cell identity access rights or restrictions, or more general user equipment-applied access rights or restrictions (*e.g.*, location area (“LA”)/tracking area (“TA”) or closed subscriber group restrictions). Modification of the access rights for a given target cell could be understood as being either time limited or permanent changes.

The process introduced herein takes advantage of existing procedures and messages described in 3GPP Technical Specifications, but provides additional information elements (“IEs”) in relevant messages (*e.g.*, handover and redirection messages). Besides including additional information elements in the related messages, some changes may be made to the procedural description for user equipment actions related to handling of the messages.

As an alternative, if the user equipment receives a network-controlled mobility command (*e.g.*, a handover command, a command for a connection release with redirection, a cell change order (“CCO”) command, *i.e.*, a network-controlled cell reselection/change) to a target cell that is currently restricted from admitting the particular user equipment, this action results in the given restriction being no longer operable. For example, a handover to a target cell with a closed subscriber group that does not include the user equipment’s allowed closed subscriber group list would mean that the user equipment (*e.g.*, through the non-access stratum) would update the allowed closed subscriber group list with the closed subscriber group identity (included in the handover command) of the target cell. If the user equipment is redirected to a cell that resides in a location area that is included in the user equipment’s list of forbidden tracking areas for roaming, then the user equipment (*e.g.*, through the non-access stratum) would remove the tracking area from its internal list. As introduced herein, E-UTRAN and RRC_Connection_Release with RedirectionInformation is included in information produced for redirection of user equipment to a target cell. The access restrictions could be included as new information element in the RRC_Connection_Release message. Of course, the basic process is not restricted to this particular case and can be applied more generally.

Handling by a user equipment of target cell access restrictions is modified, as introduced herein, in the case wherein the network redirects the user equipment to a target cell to which the user equipment has no access rights due to a current access restriction. An example of such a restriction would be a cell located in a location area/tracking area that is listed on user equipment’s list of “forbidden location areas for roaming.”

The current 3GPP Release 8 format of the RRC_Connection_Release message (as described in the present 3GPP TS 36.331) includes the following RedirectionInformation (as described in ASN-1 code taken from the 3GPP TS 36.331 RRC_Connection_Release message).

```
RRC_Connection_Release-r8-IEs:      =      SEQUENCE
{releaseCause                        ReleaseCause,
redirectionInformation              RedirectionInformation  OPTIONAL,-- Need ON
idleModeMobilityControlInfo        IdleModeMobilityControlInfo  OPTIONAL,-- Need OP
nonCriticalExtension                SEQUENCE {}              OPTIONAL -- Need OP}
```

As reproduced from the RRC_Connection_Release field description in 3GPP TS 36.331, the following terms are defined as set forth below. The ReleaseCause is used to indicate the reason for releasing the RRC Connection. The RedirectionInformation is used to redirect the user equipment to another E-UTRA or an inter-RAT carrier frequency, by means of the cell selection upon leaving RRC_CONNECTED as specified in 3GPP TS 36.304. The

idleModeMobilityControlInfo provides dedicated cell reselection priorities used for cell reselection as specified in 3GPP TS 36.304.

RedirectionInformation is defined as set forth below.

```
RedirectionInformation ::= CHOICE
    {eutra-CarrierFreq      EUTRA-DL-CarrierFreq,
     interRAT-target        CHOICE {
         geran                GERAN-CarrierFreq,
         utra-FDD              UTRA-DL-CarrierFreq,
         utra-TDD              UTRA-DL-CarrierFreq,
         cdma2000-HRPD         CDMA2000-CarrierInfo,
         cdma2000-1xRTT       CDMA2000-CarrierInfo}
```

IdleModeMobilityControlInfo is defined as set forth below.

```
IdleModeMobilityControlInfo ::= SEQUENCE
    {interFreqPriorityList      InterFreqPriorityList      OPTIONAL, -- Need
    ON
     geran-FreqPriorityList      GERAN-FreqPriorityList      OPTIONAL, -- Need
    ON
     utra-FDD-FreqPriorityList    UTRA-FDD-FreqPriorityList    OPTIONAL, -- Need
    ON
     utra-TDD-FreqPriorityList    UTRA-TDD-FreqPriorityList    OPTIONAL, -- Need
    ON
     hrpd-BandClassPriorityList    HRPD-BandClassPriorityList    OPTIONAL, -- Need
    ON
     oneXRTT-BandClassPriorityList OneXRTT-BandClassPriorityList OPTIONAL, -- Need ON
    t320                        ENUMERATED
                                {min5, min10, min20, min30, min60, min120, min180, spare}
                                OPTIONAL, -- Need
    OD...}
```

Reference again is made to 3GPP TS 36.331, wherein the EUTRA-DL-CarrierFreq (“EARFCN”) is used in the downlink (“DL”) as defined in 3GPP TS 36.101 v8.5.0 (2009-03), which is incorporated herein by reference, and HRPD above refers to high rate packet data. The GSM Enhanced Data rates for Global Evolution Radio Access Network (“GERAN”)-CarrierFreq indicates a frequency and band indicator of the cell. The UTRA-DL-CarrierFreq indicates a frequency of the cell. The Code Division Multiple Access (“CDMA”)2000-CarrierInfo indicates a frequency and band class of the cell. The 3GPP Technical Specification Release 8 for a redirection case thus does not include detailed target cell information produced by a base station related to changing or altering user equipment access restrictions or rights in a target base station.

As introduced herein, information is included, for instance, in an RRC_Connection_Release message transmitted by a base station which, when or if received by a user equipment, alters the user equipment’s current access restrictions in a given target base station. Here, the target base station could be a cell or a larger area (*e.g.*, a location area). There are several options for processes in which this could be realized as set forth below.

A first option includes enabling the source base station to transmit a system information block one (“SIB 1”) for the target cell (*e.g.*, a target base station) to the user equipment. This could be done, for example, by preparing a potential target cell such that the user equipment is given the system information block one of the potential target cell at some point in time prior to the transmission of an actual release message for the source cell. This could be done by forwarding the system information block one (*e.g.*, in a release message) in one of the parts related to redirection, or by another dedicated signaling means.

A second option is to transmit relevant information from the target cell system information block one (*e.g.*, including the closed subscriber group identity, cell identity, location area, tracking area, *etc.*) to the user equipment. This option is similar to the first option, except that only the access restriction-related information is distributed from the target cell to the user equipment. For example, parameters such as the closed subscriber group identity, cell identity, location area, tracking area, *etc.*, could be transmitted to the user equipment.

A third option is for the source base station to overwrite the closed subscriber group status of the target cell (*e.g.*, a target base station). For example, the closed subscriber group indicator could be set to FALSE. This option includes a setting that informs the user equipment to be handed over despite broadcast information transmitted by the target cell, the closed subscriber group indicator of the target cell is to be understood as being FALSE (*i.e.*, a broadcast parameter is overwritten).

A fourth option is to indicate potential time constraints for the closed subscriber group status of the user equipment in the target cell (*e.g.*, a target base station). A default value could be

used, for example, a time-limited value, a value valid for the duration of the RRC_Connected state, or a permanently changed value. In connection with dedicated information distributed as described herein, the base station could indicate for how long a period of time the received target cell information is valid. A time parameter could be given as a real time value, a system frame number ("SFN"), a duration of an active RRC_Connection state, a permanent value, or a value applicable for the given cell.

Information given in such a manner as described herein could also be employed for updating or altering an internal user equipment list, such as the allowed closed subscriber group list (*e.g.*, adding the closed subscriber group identity included in the message to the allowed closed subscriber group list maintained in the user equipment), a list of forbidden tracking areas for roaming (*e.g.*, removing the given tracking area from the list of forbidden tracking areas for roaming that is maintained in the user equipment), as well as other similar lists maintained in a user equipment. An update could be time limited or permanent. Several procedural examples for enabling handover to a restricted target cell are now described herein.

A home base station or a group of home base stations (*e.g.*, source base station(s)) may potentially be structured so that it can also be accessed by user equipment that do not belong to the closed subscriber group of that particular home base station or group of home base stations. A home base station is typically a base station or installation in users home environment. This process should be supported by communication network (such as E-UTRAN and/or a core net ("CN")) interactions as well as supporting bookkeeping. A core net includes layers above the radio resource control such as the mobile management entity and higher layers. When the above subscription policies are configured for use in E-UTRAN and core net, then it is possible that E-UTRAN orders user equipment not belonging to a particular closed subscriber group (*e.g.*, a CSG A) to move or camp to home base stations belonging to that closed subscriber group (*i.e.*, the CSG A). To avoid an unnecessarily complex implementation for the user equipment, a mechanism as described below can be used for implementation when the user equipment is in a connected state.

A mechanism is described, according to an embodiment, for handover (or redirection) of a user equipment to a target cell (*e.g.*, a target base station) with an access restriction. A handover command is received from the network/base station directing the user equipment to move to a closed subscriber group cell to which the user equipment does not have an access subscription. The handover command is transmitted so that dedicated information is included in the handover message describing the target cell. The dedicated information in this case indicates that the target cell is not a closed subscriber group cell (*e.g.*, a CSG-Indication flag is set to FALSE), and accordingly the user equipment will not check any internal closed subscriber group white list. The user equipment treats the target cell as a normal macro cell, camps on it, and makes access

thereto. While camped on that cell, the user equipment follows the dedicated information in the handover message about that cell instead of responding to broadcasted information transmitted by the new source cell (*e.g.*, the target base station in handover) that may contain an access restriction.

Then, when the RRC_Connection is released from the new source cell, the user equipment executes a normal cell selection procedure based on the broadcasted information. In other words, the particular closed subscriber group cell is not selected, because the user equipment recognizes an access restriction for that target cell from its internal closed subscriber group white list.

A mechanism for redirection of user equipment to a target cell with an access restriction is hereinafter described. An RRC_Connection_Release with Redirection message is received by the user equipment from its current base station. A redirection is less controlled than a handover, and may experience data loss as compared to a cell change performed in accordance with a handover. The redirection information directs the user equipment to camp on a closed subscriber group cell to which the user equipment is not subscribed. In addition, the redirection message gives a dedicated indication to the user equipment that the particular cell is not a closed subscriber group cell (*e.g.*, CSG- Indication set to "FALSE"). Accordingly, the user equipment treats the target cell as a normal macro cell and camps on it and makes access thereto. While remaining camped on that cell, the user equipment follows its internal dedicated information about the cell's closed subscriber group status (as received from the former source cell, which is the initiator of the redirection command) instead of responding to information broadcast from the cell (*e.g.*, the base station).

Thus, as introduced herein, the user equipment can be handed over to a target cell or redirected with an access restriction by including a new field in the RRC_Connection_Release message with a redirection information element containing tracking area/location area information of the given redirection. The user equipment would respond by removing such tracking area/location area information from its list of forbidden tracking areas for roaming. This enables the user equipment to access cells with that tracking area/location area information.

For a handover and/or redirection, the CSG ID of the target cell would be included with a handover or redirection command, which the user equipment would then incorporate into its allowed closed subscriber group list with or according to a potentially included time restriction. More than one CSG ID could be included with a handover command to handle a potentially confusing physical cell identity ("PCI") scenario. A physical cell identity is obtained by the user equipment from a cell during a cell identification procedure and may be used in handover commands.

Advantages of processes introduced herein allow for reliable redirection of the user equipment to a cell, frequency, *etc.*, with an access restriction, with little added complexity. The processes potentially solve connected mode mobility for a closed subscriber group in a straightforward and efficient way. The processes also potentially remove the need for hybrid closed subscriber group. A hybrid closed subscriber group is a closed subscriber group cell that is also accessible for users who do not have the CSG ID in its allowed closed subscriber group list.

Turning now to FIGURE 6, illustrated is an exemplary sequence of operations performed at a base station to handover a user equipment to a target base station including an access restriction for the user equipment according to the principles of the present invention. The steps of the handover process begin at the source base station at a step 610. In a step 620, the source base station assesses whether the user equipment should be handed over to a target base station. If there is no need for a handover of the user equipment, the process exits at a step 680. If there is a need for a handover of the user equipment, the process continues in a step 630 wherein the source base station assesses whether the user equipment will be denied access at the target base station by an access restriction. If access will not be denied, in a step 670 the source base station executes a handover process of the user equipment. If an access restriction is operative for the user equipment at the target base station, the source base station produces a message, as indicated in a step 640, directing the user equipment performing the handover to modify an internal access restriction list (*e.g.*, a closed subscriber group list) to indicate that the user equipment now has access to the target base station. In a step 650, the source base station produces a message directing the target base station to admit the user equipment upon handover. In a step 660, the source base station transmits the respective messages to the user equipment and to the target base station. In a step 670, the source base station executes the handover of the user equipment to the target base station. The process ends in a step 680.

Turning now to FIGURE 7, illustrated is an exemplary sequence of operations performed at a user equipment for handover to a target base station when an access restriction for the user equipment at the target base station is operative according to the principles of the present invention. The steps of the handover process are executed at the user equipment beginning at a step 710. In a step 720, the user equipment determines if it will be handed the over to a target base station. If there is no need for a handover, the process ends at a step 780. As indicated in a step 730, if there is a need for a handover of the user equipment to the target base station, the user equipment determines if an access restriction is operative for the intended target base station. If there is no operative access restriction, as indicated in a step 760, the handover process to the target base station is executed. As indicated in a step 740, if there is an operative access restriction, the user equipment determines if an access restriction modification has been received from the source base station. If an access restriction modification has been received, an internal

access restriction list (*e.g.*, a closed subscriber group list) is modified, as indicated in a step 750. Then, as indicated in a step 760, the handover to the base station is executed, and the process ends in a step 780. If an access restriction modification has not been received from the source base station, as indicated in a step 740, the user equipment searches for another base station and executes a handover thereto. The process then ends in a step 780.

Turning now to FIGURE 8, illustrated is an exemplary sequence of operations performed at a base station to redirect user equipment including an access restriction for the user equipment according to the principles of the present invention. The steps of the redirection process begin at the source base station at a step 810. In a step 820, the source base station assesses whether the user equipment should be redirected. If there is no need for a redirection of the user equipment, the process exits at a step 880. If there is a need for a redirection of the user equipment, the process continues in a step 830 wherein the source base station assesses whether the user equipment will be denied access by an access restriction. If access will not be denied, in a step 870 the source base station executes a redirection process of the user equipment. If an access restriction is operative for the user equipment, the source base station produces a message, as indicated in a step 840, directing the user equipment performing the redirection to modify an internal access restriction list (*e.g.*, a closed subscriber group list) to indicate that the user equipment can be redirected. In a step 850, the source base station produces a message enabling redirection of the user equipment. In a step 860, the source base station transmits the respective messages to the user equipment. In a step 870, the source base station executes the redirection of the user equipment. The process ends in a step 880.

Turning now to FIGURE 9, illustrated is an exemplary sequence of operations performed at user equipment for a redirection of the user equipment when an access restriction for the user equipment is operative according to the principles of the present invention. The steps of the redirection process are executed at the user equipment beginning at a step 910. In a step 920, the user equipment determines if it will be redirected. If there is no need for a redirection, the process ends at a step 980. As indicated in a step 930, if there is a need for a redirection of the user equipment, the user equipment determines if an access restriction is operative. If there is no operative access restriction, as indicated in a step 960, the redirection process is executed. As indicated in a step 940, if there is an operative access restriction, the user equipment determines if an access restriction modification has been received from the source base station. If an access restriction modification has been received, an internal access restriction list (*e.g.*, a closed subscriber group list) is modified, as indicated in a step 950. Then, as indicated in a step 960, the redirection is executed, and the process ends in a step 980. If an access restriction modification has not been received from the source base station, as indicated in a step 940, the user equipment searches for another resource and executes a redirection. The process then ends in a step 980.

In one embodiment, the present invention provides an apparatus (*e.g.*, a base station) including a transceiver configured to communicate with a target base station and user equipment, wherein the target base station includes an access restriction for the user equipment. A processor (*e.g.*, a resource manager thereof) of the base station is configured to produce a first message directing the user equipment to modify an internal access restriction list in the user equipment that may restrict the user equipment from communication with the target base station when the processor determines a need to hand over the user equipment to the target base station. The processor is also configured to produce a second message for the target base station directing the target base station to admit communication with the user equipment. The base station is also configured to transmit at least a portion of a system information block of the target base station to the user equipment prior to transmitting a release message to the user equipment. The base station may include a portion of the system information block in the release message. The system information block may include at least one of a closed subscriber group identity, a cell identity, a location area, and a tracking area associated with the user equipment.

In another embodiment, the present invention provides an apparatus (*e.g.*, a base station) including a transceiver configured to communicate with a target base station and user equipment, wherein the target base station includes an access restriction for the user equipment. A processor (*e.g.*, a resource manager thereof) of the base station is configured to produce a message directing the target base station to modify the closed subscriber group status of the user equipment when the processor determines a need to hand over the user equipment to the target base station. The processor (*e.g.*, a resource manager thereof) is also configured to produce a signal for the user equipment directing the user equipment to ignore broadcast information transmitted by the target base station indicating restricted access by the user equipment to the target base station. The base station and user equipment may operate on a time limit for the modified closed subscriber group status of the target base station, wherein the time limit includes at least one of a real time value, a system frame number, and a duration of an active RRC_Connection state. The processor (*e.g.*, a resource manager thereof) is also configured to produce a signal for the user equipment directing the user equipment to modify an internal access restriction list (*e.g.*, a closed subscriber group list).

In another embodiment, the present invention provides an apparatus (*e.g.*, user equipment) including a transceiver configured to communicate with a source base station and a target base station, wherein the target base station includes a list including an access restriction for the user equipment. A processor (*e.g.*, a resource manager thereof) of the user equipment is configured to modify an internal access restriction list in the user equipment that may include the access restriction for the user equipment for the target base station in response to a message transmitted from the source base station. The processor (*e.g.*, a resource manager thereof) of the

user equipment is configured to modify a datum in the internal access restriction list related to at least a portion of a system information block of the target base station in response to the message transmitted from the source base station. The portion of the system information block includes at least one of a closed subscriber group identity, a cell identity, a location area, and a tracking area associated with the user equipment. The message transmitted from the source base station may include a release message.

In another embodiment, the present invention provides an apparatus (*e.g.*, a base station) including a transceiver configured to communicate with user equipment, wherein the user equipment includes an access restriction. A processor (*e.g.*, a resource manager thereof) of the base station is configured to produce a first message directing the user equipment to modify an internal access restriction list in the user equipment when the processor determines a need to redirect the user equipment. The processor is also configured to produce a second message for redirecting the user equipment. The redirection may include a communication with another base station, communicating at another frequency, communicating employing a different a radio access technology, *etc.* The base station is also configured to transmit at least a portion of a system information block to the user equipment prior to transmitting a release message to the user equipment. The base station may include a portion of the system information block in the release message. The system information block may include at least one of a closed subscriber group identity, a cell identity, a location area, and a tracking area associated with the user equipment.

In another embodiment, the present invention provides an apparatus (*e.g.*, user equipment) including a transceiver configured to communicate with a source base station, wherein the user equipment includes a list with an access restriction for the user equipment. A processor (*e.g.*, a resource manager thereof) of the user equipment is configured to modify an internal access restriction list in the user equipment that may include the access restriction for the user equipment for a redirection in response to a message transmitted from the source base station. The redirection may include a communication with another base station, communicating at another frequency, communicating employing a different a radio access technology, *etc.* The processor (*e.g.*, a resource manager thereof) of the user equipment is configured to modify a datum in the internal access restriction list related to at least a portion of a system information block in response to the message transmitted from the source base station. The portion of the system information block includes at least one of a closed subscriber group identity, a cell identity, a location area, and a tracking area associated with the user equipment. The message transmitted from the source base station may include a release message.

Program or code segments making up the various embodiments of the present invention may be stored in a computer readable medium or transmitted by a computer data signal embodied

in a carrier wave, or a signal modulated by a carrier, over a transmission medium. For instance, a computer program product including a program code stored in a computer readable medium may form various embodiments of the present invention. The "computer readable medium" may include any medium that can store or transfer information. Examples of the computer readable medium include an electronic circuit, a semiconductor memory device, a read only memory ("ROM"), a flash memory, an erasable ROM ("EROM"), a floppy diskette, a compact disk ("CD")-ROM, an optical disk, a hard disk, a fiber optic medium, a radio frequency ("RF") link, and the like. The computer data signal may include any signal that can propagate over a transmission medium such as electronic communication network channels, optical fibers, air, electromagnetic links, RF links, and the like. The code segments may be downloaded via computer networks such as the Internet, Intranet, and the like.

As described above, the exemplary embodiment provides both a method and corresponding apparatus consisting of various modules providing functionality for performing the steps of the method. The modules may be implemented as hardware (embodied in one or more chips including an integrated circuit such as an application specific integrated circuit), or may be implemented as software or firmware for execution by a computer processor. In particular, in the case of firmware or software, the exemplary embodiment can be provided as a computer program product including a computer readable storage structure embodying computer program code (*i.e.*, software or firmware) thereon for execution by the computer processor.

Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made herein without departing from the spirit and scope of the invention as defined by the appended claims. For example, many of the features and functions discussed above can be implemented in software, hardware, or firmware, or a combination thereof. Also, many of the features, functions and steps of operating the same may be reordered, omitted, added, *etc.*, and still fall within the broad scope of the present invention.

Moreover, the scope of the present application is not intended to be limited to the particular embodiments of the process, machine, manufacture, composition of matter, means, methods and steps described in the specification. As one of ordinary skill in the art will readily appreciate from the disclosure of the present invention, processes, machines, manufacture, compositions of matter, means, methods, or steps, presently existing or later to be developed, that perform substantially the same function or achieve substantially the same result as the corresponding embodiments described herein may be utilized according to the present invention. Accordingly, the appended claims are intended to include within their scope such processes, machines, manufacture, compositions of matter, means, methods, or steps.

WHAT IS CLAIMED IS:

1. An apparatus, comprising:
a processor; and
memory including computer program code
said memory and said computer program code configured to, with said processor, cause said apparatus to perform at least the following:
determine that a user equipment has an access restriction with respect to a redirection thereof;
direct said user equipment to modify an internal access restriction list with respect to said access restriction; and
direct said user equipment to execute said redirection.
2. The apparatus as recited in Claim 1 wherein said redirection comprises communication with a target base station and said memory and said computer program code is configured to, with said processor, cause said apparatus to direct said user equipment to modify said internal access restriction list to allow communication with said target base station and direct said user equipment to execute a handover to said target base station.
3. The apparatus as recited in Claim 2 wherein said memory and said computer program code is configured to, with said processor, cause said apparatus to direct a system information block of said target base station to be transmitted to said user equipment, said system information block comprising at least one of a closed subscriber group identity, a cell identity, a location area and a tracking area associated with said user equipment.
4. The apparatus as recited in Claim 2 wherein said memory and said computer program code is configured to, with said processor, cause said apparatus to produce a signal directing said user equipment to ignore broadcast information transmitted by said target base station indicating restricted access by said user equipment thereto.
5. The apparatus as recited in Claim 1 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.
6. The apparatus as recited in Claim 1 wherein a modification to said internal access restriction list is time limited.

7. The apparatus as recited in Claim 1 wherein said memory and said computer program code is configured to, with said processor, cause said apparatus to direct said user equipment to modify said internal access restriction list with respect to said access restriction in accordance with a command to a forbidden location area.

8. An apparatus, comprising:
means for determining that a user equipment has an access restriction with respect to a redirection thereof;
means for directing said user equipment to modify an internal access restriction list with respect to said access restriction; and
means for directing said user equipment to execute said redirection.

9. The apparatus as recited in Claim 8 wherein said redirection comprises communication with a target base station and said apparatus further comprises means for directing said user equipment to modify said internal access restriction list to allow communication with said target base station and means for directing said user equipment to execute a handover to said target base station.

10. The apparatus as recited in Claim 8 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.

11. A computer program product comprising a program code stored in a computer readable medium configured to:
determine that a user equipment has an access restriction with respect to a redirection thereof;
direct said user equipment to modify an internal access restriction list with respect to said access restriction; and
direct said user equipment to execute said redirection.

12. The computer program product as recited in Claim 11 wherein said redirection comprises communication with a target base station and said program code stored in said computer readable medium is configured to direct said user equipment to modify said internal access restriction list to allow communication with said target base station and direct said user equipment to execute a handover to said target base station.

13. The computer program product as recited in Claim 11 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.

14. A method, comprising:
determining that a user equipment has an access restriction with respect to a redirection thereof;

directing said user equipment to modify an internal access restriction list with respect to said access restriction; and

directing said user equipment to execute said redirection.

15. The method as recited in Claim 14 wherein said redirection comprises communication with a target base station and said method further comprises directing said user equipment to modify said internal access restriction list to allow communication with said target base station and directing said user equipment to execute a handover to said target base station.

16. The method as recited in Claim 14 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.

17. The method as recited in Claim 14 wherein a modification to said internal access restriction list is time limited.

18. The method as recited in Claim 14 wherein said directing said user equipment to modify said internal access restriction list with respect to said access restriction is in accordance with a command to a forbidden location area.

19. An apparatus, comprising:
a processor; and
memory including computer program code
said memory and said computer program code configured to, with said processor, cause said apparatus to perform at least the following:

modify an internal access restriction list of a user equipment with respect to an access restriction for a redirection thereof; and

execute said redirection.

20. The apparatus as recited in Claim 19 wherein said redirection comprises communication with a target base station and said memory and said computer program code is configured to, with said processor, cause said apparatus to modify said internal access restriction list to allow communication with said target base station and execute a handover to said target base station.

21. The apparatus as recited in Claim 20 wherein said memory and said computer program code is configured to, with said processor, cause said apparatus to modify said internal access restriction list in accordance with a system information block of said target base station, said system information block comprising at least one of a closed subscriber group identity, a cell identity, a location area and a tracking area associated with said user equipment.

22. The apparatus as recited in Claim 20 wherein said memory and said computer program code is configured to, with said processor, cause said apparatus to ignore broadcast information transmitted by said target base station indicating restricted access by said user equipment thereto.

23. The apparatus as recited in Claim 19 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.

24. The apparatus as recited in Claim 19 wherein a modification to said internal access restriction list is time limited.

25. The apparatus as recited in Claim 19 wherein said memory and said computer program code is configured to, with said processor, cause said apparatus to modify said internal access restriction list of said user equipment with respect to said access restriction in accordance with a command to a forbidden location area.

26. An apparatus, comprising:
means for modifying an internal access restriction list of a user equipment with respect to an access restriction for a redirection thereof; and
means for executing said redirection.

27. The apparatus as recited in Claim 26 wherein said redirection comprises communication with a target base station and said apparatus further comprises means for modifying said internal access restriction list to allow communication with said target base station and means for executing a handover to said target base station.

28. The apparatus as recited in Claim 26 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.

29. A computer program product comprising a program code stored in a computer readable medium configured to:

modify an internal access restriction list of a user equipment with respect to an access restriction for a redirection thereof; and
execute said redirection.

30. The computer program product as recited in Claim 28 wherein said redirection comprises communication with a target base station and said program code stored in said computer readable medium is configured to modify said internal access restriction list to allow communication with said target base station and execute a handover to said target base station.

31. The computer program product as recited in Claim 28 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.

32. A method, comprising:
modifying an internal access restriction list of a user equipment with respect to an access restriction for a redirection thereof; and
executing said redirection.

33. The method as recited in Claim 32 wherein said redirection comprises communication with a target base station and said method further comprises modifying said internal access restriction list to allow communication with said target base station and executing a handover to said target base station.

34. The method as recited in Claim 32 wherein said redirection comprises one of communication at another frequency and with a different a radio access technology.

35. The method as recited in Claim 32 wherein a modification to said internal access restriction list is time limited.

36. The method as recited in Claim 32 wherein said modifying said internal access restriction list of said user equipment with respect to said access restriction is in accordance with a command to a forbidden location area.

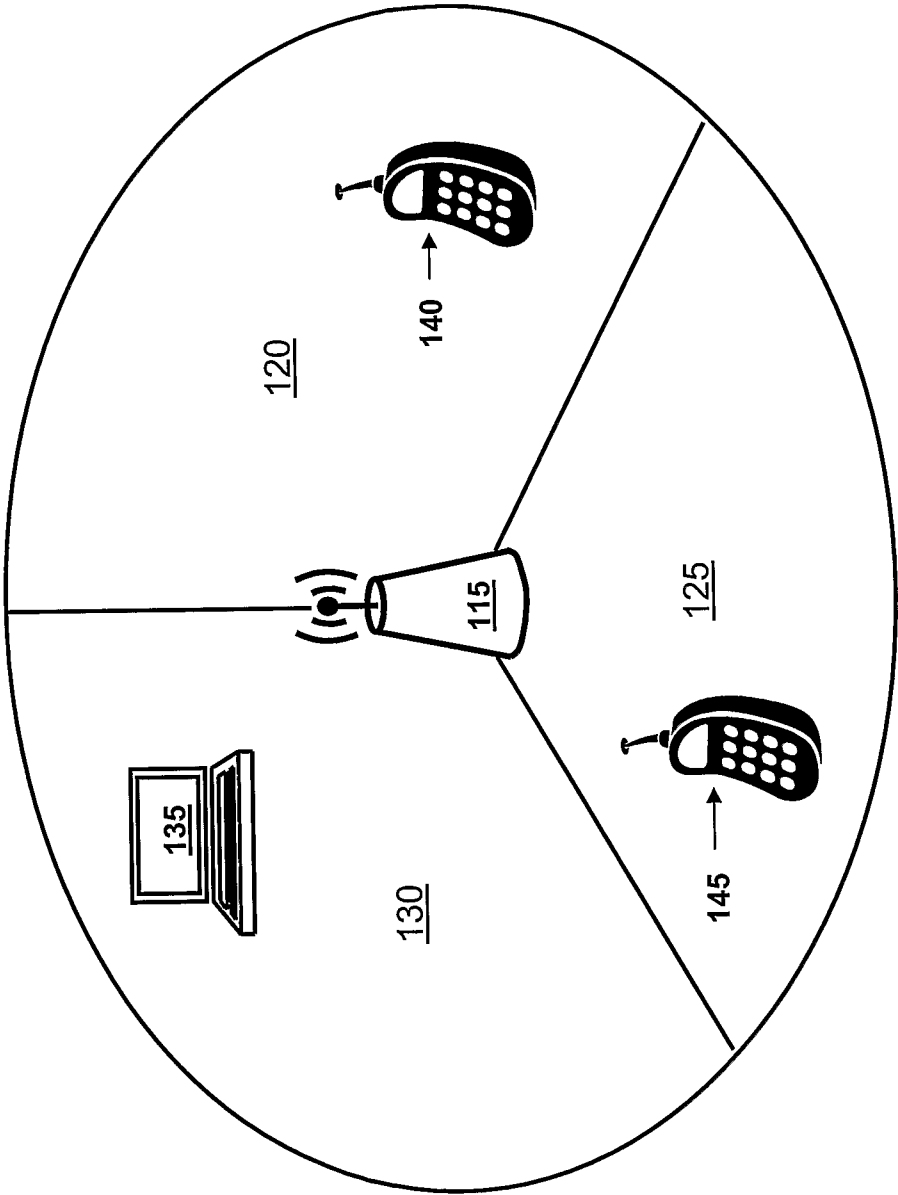


FIGURE 1

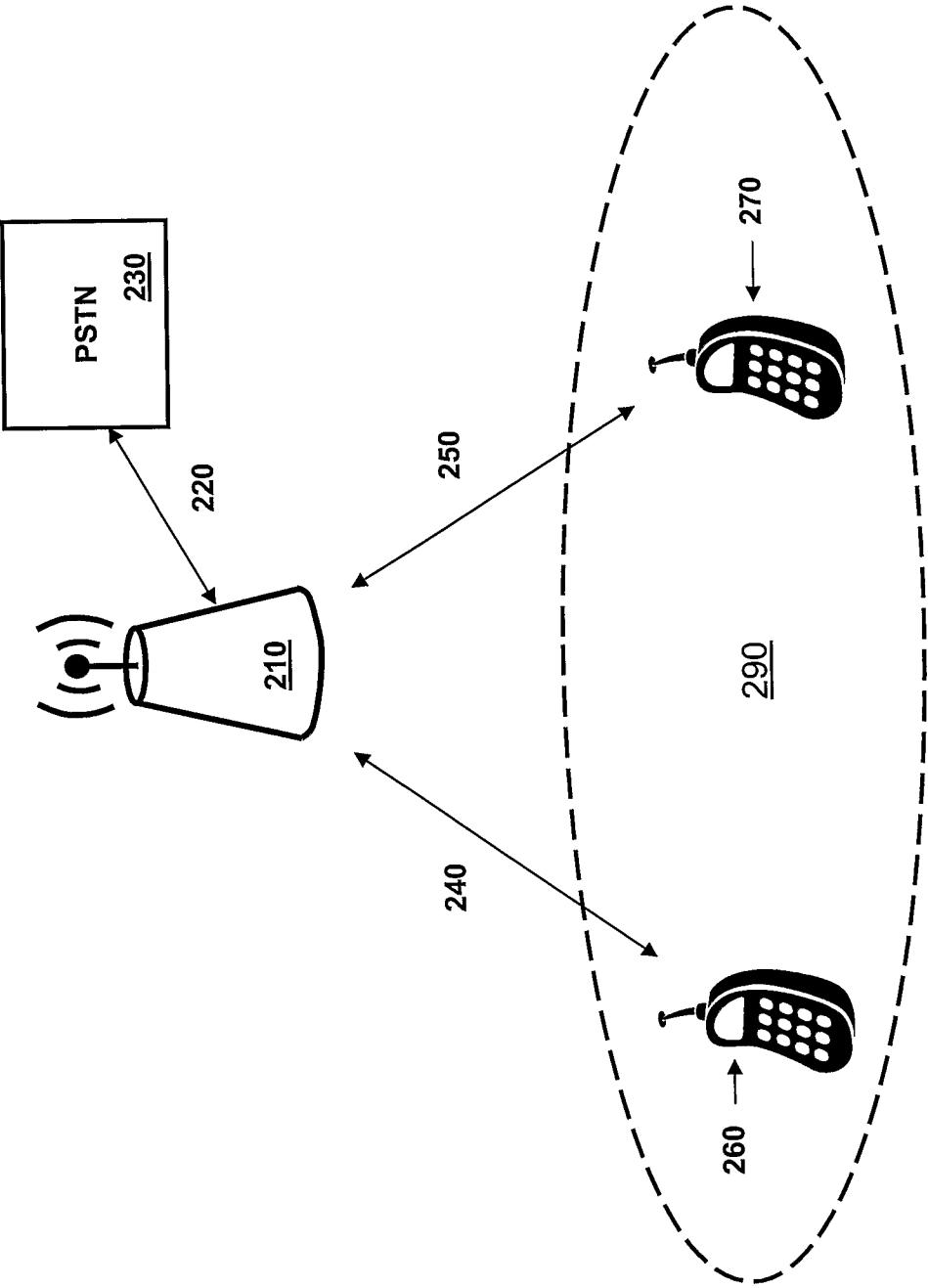


FIGURE 2

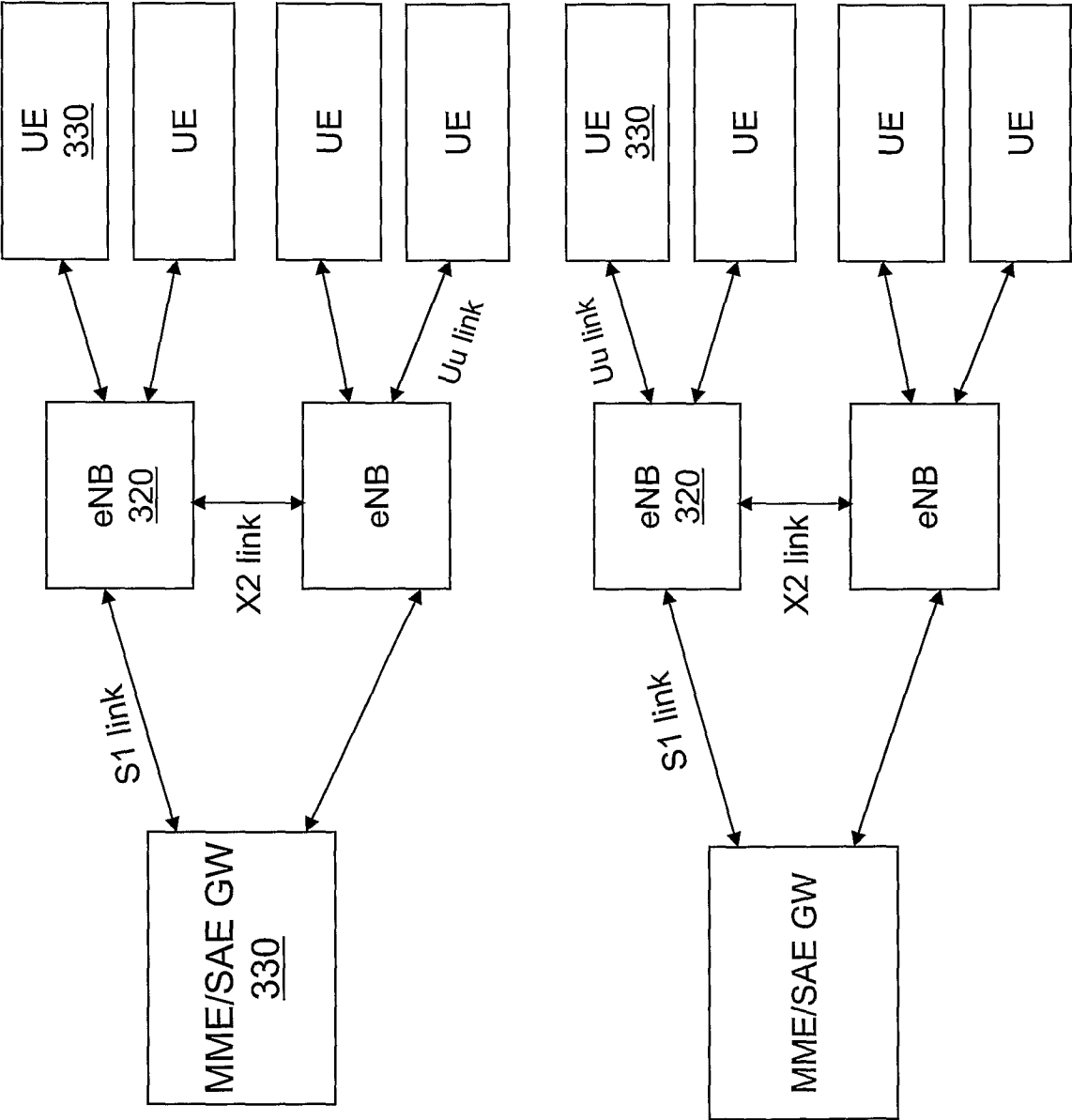


FIGURE 3

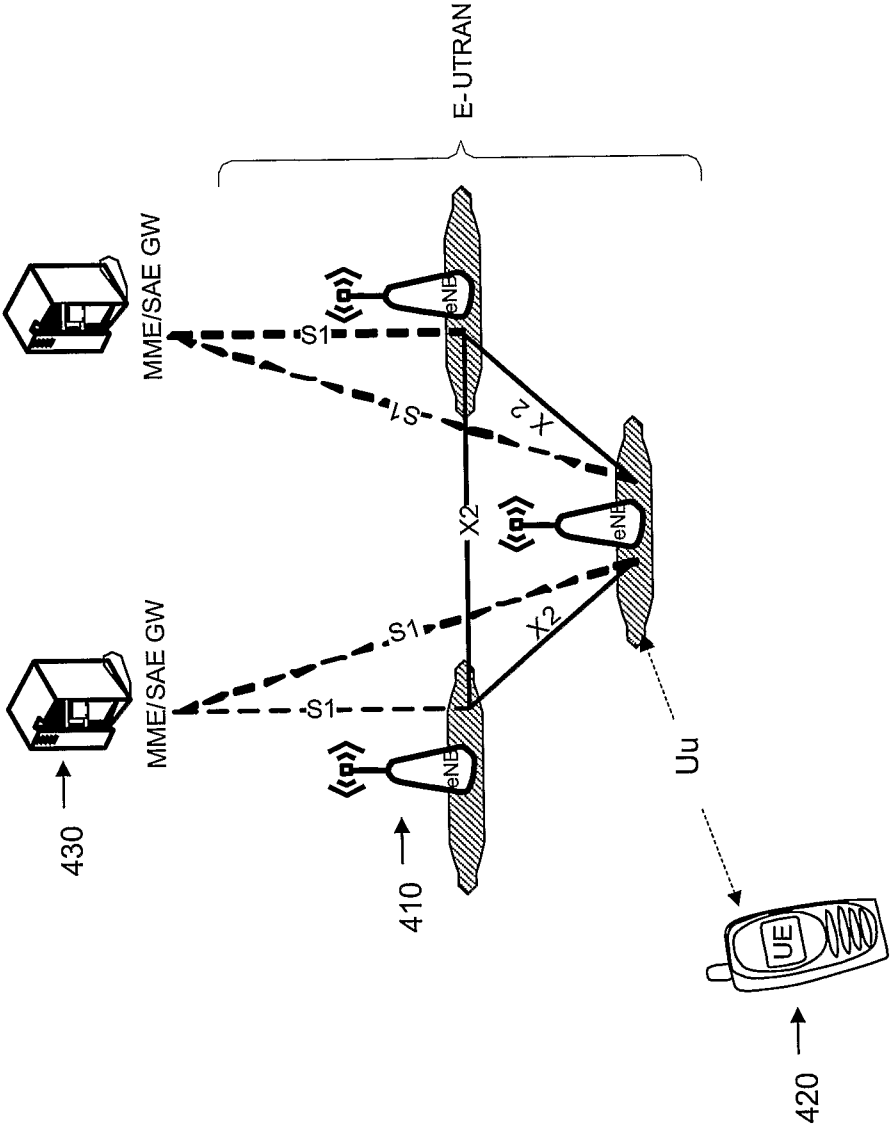


FIGURE 4

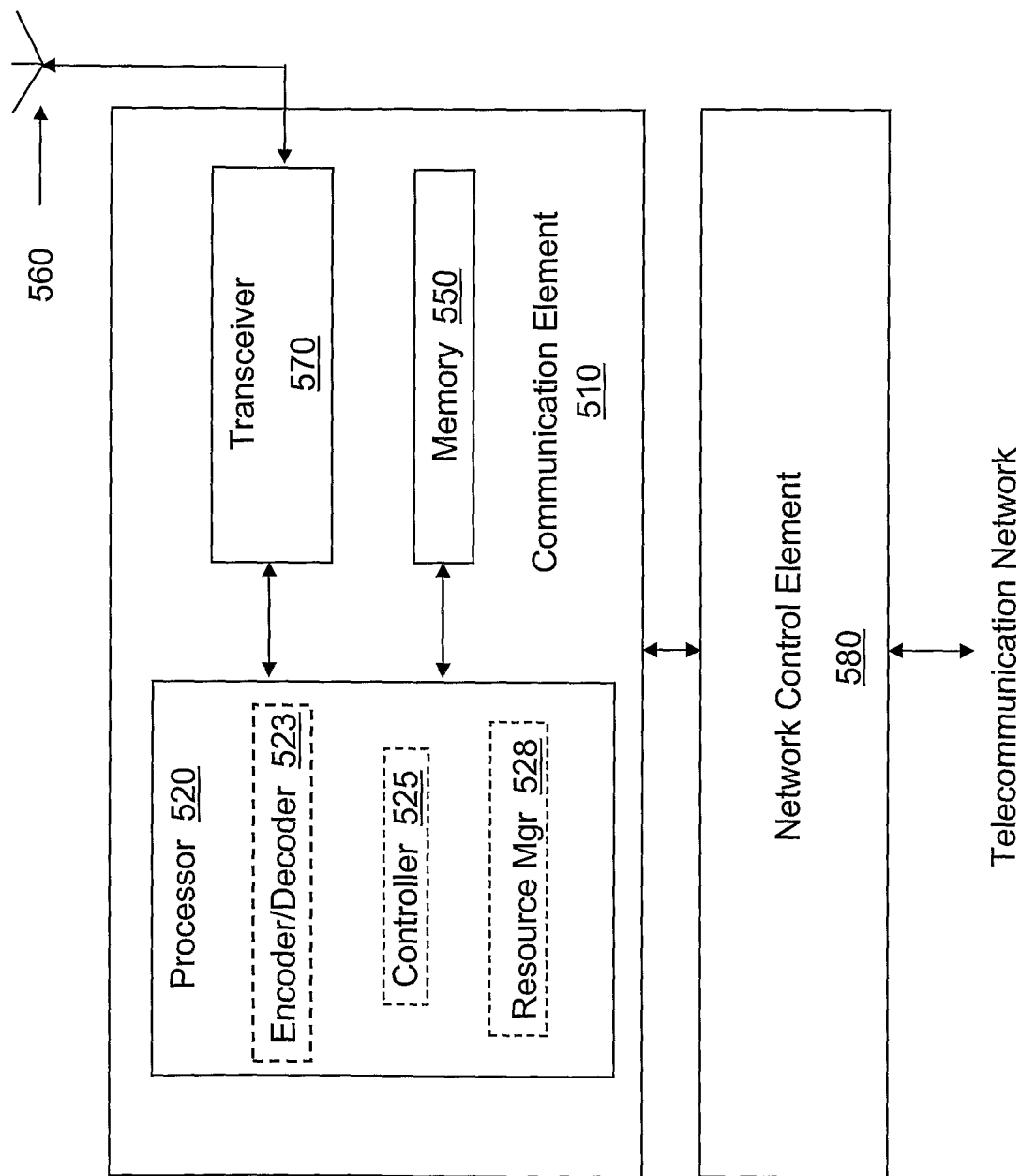


FIGURE 5

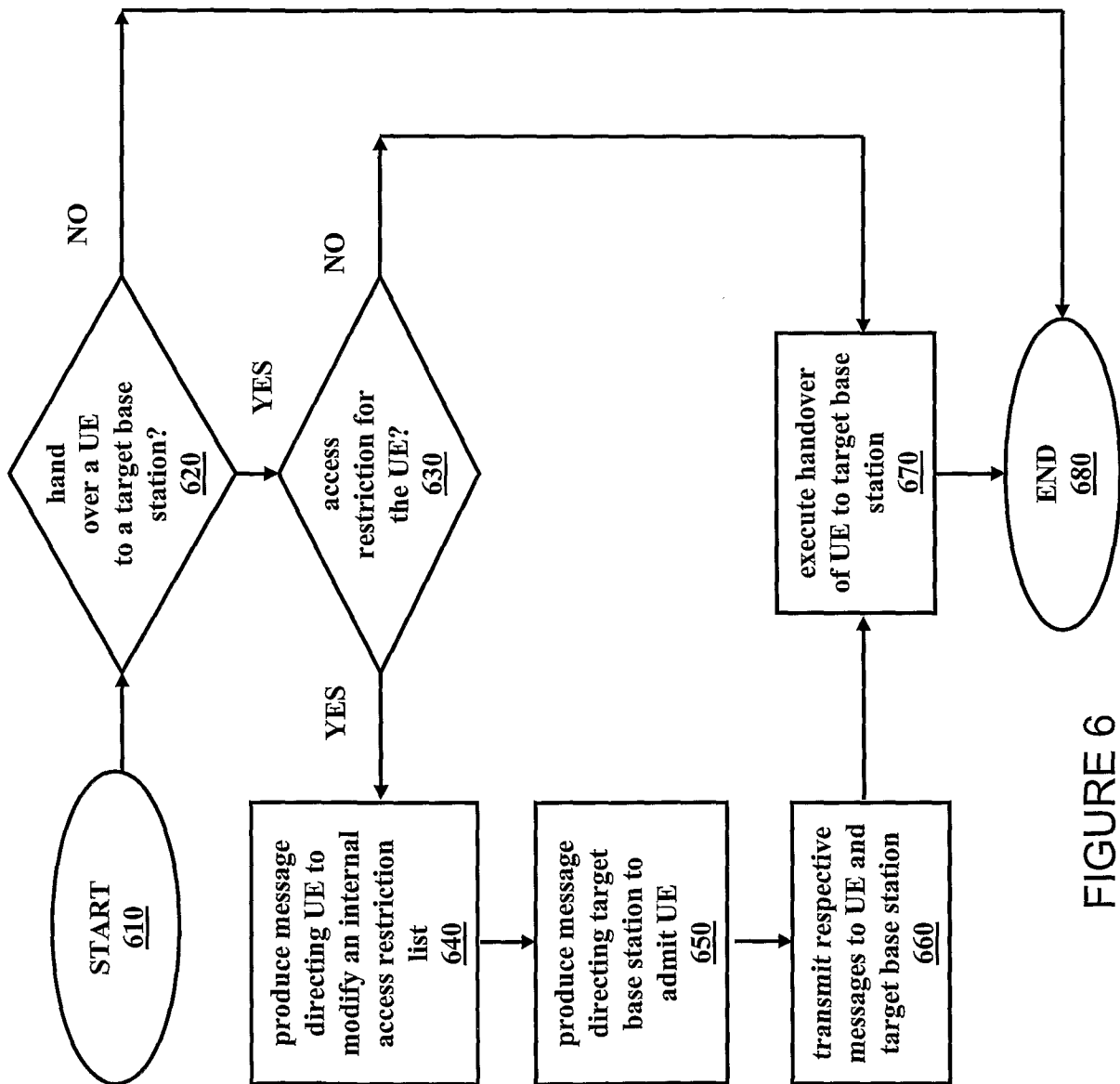


FIGURE 6

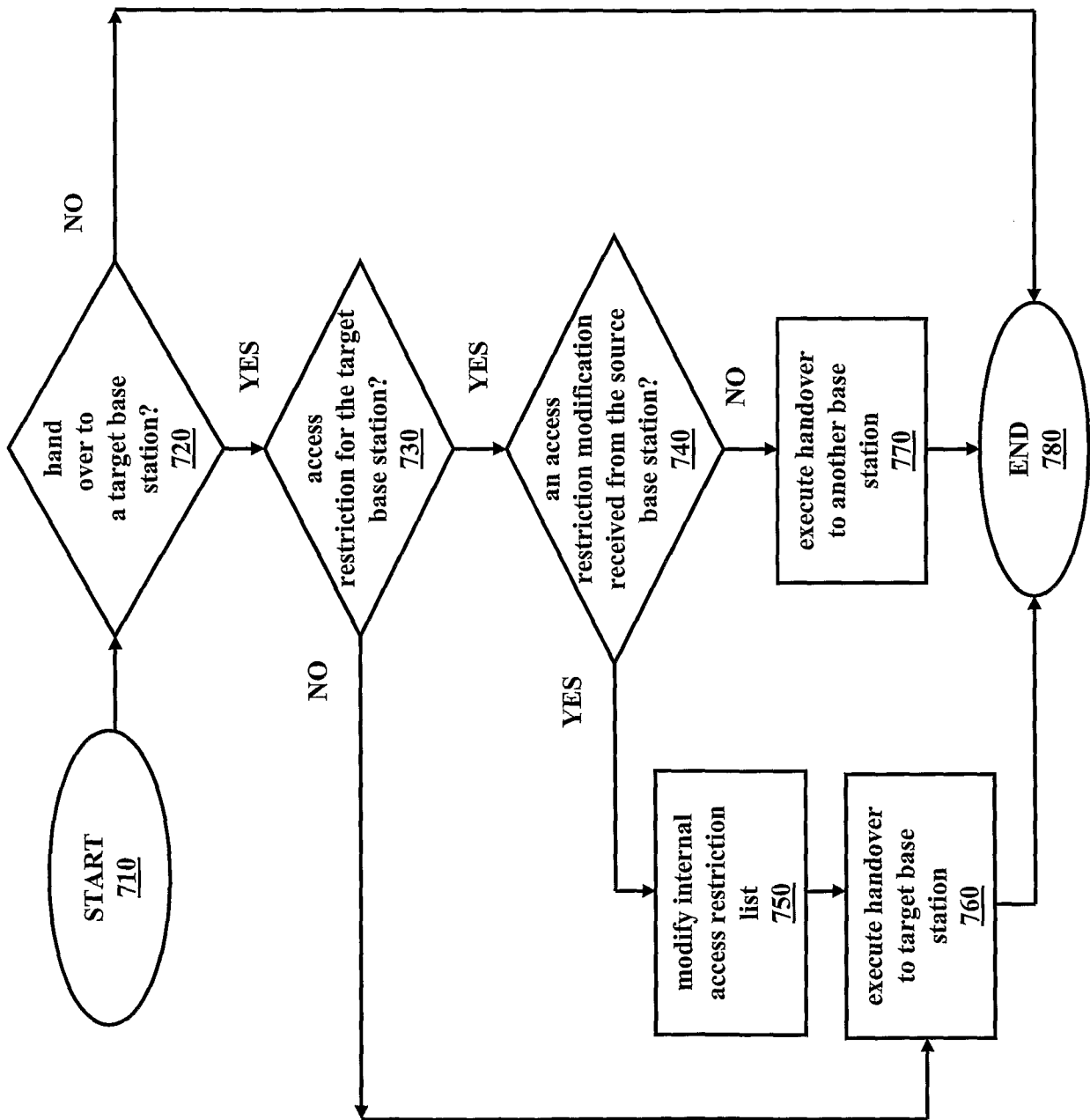


FIGURE 7

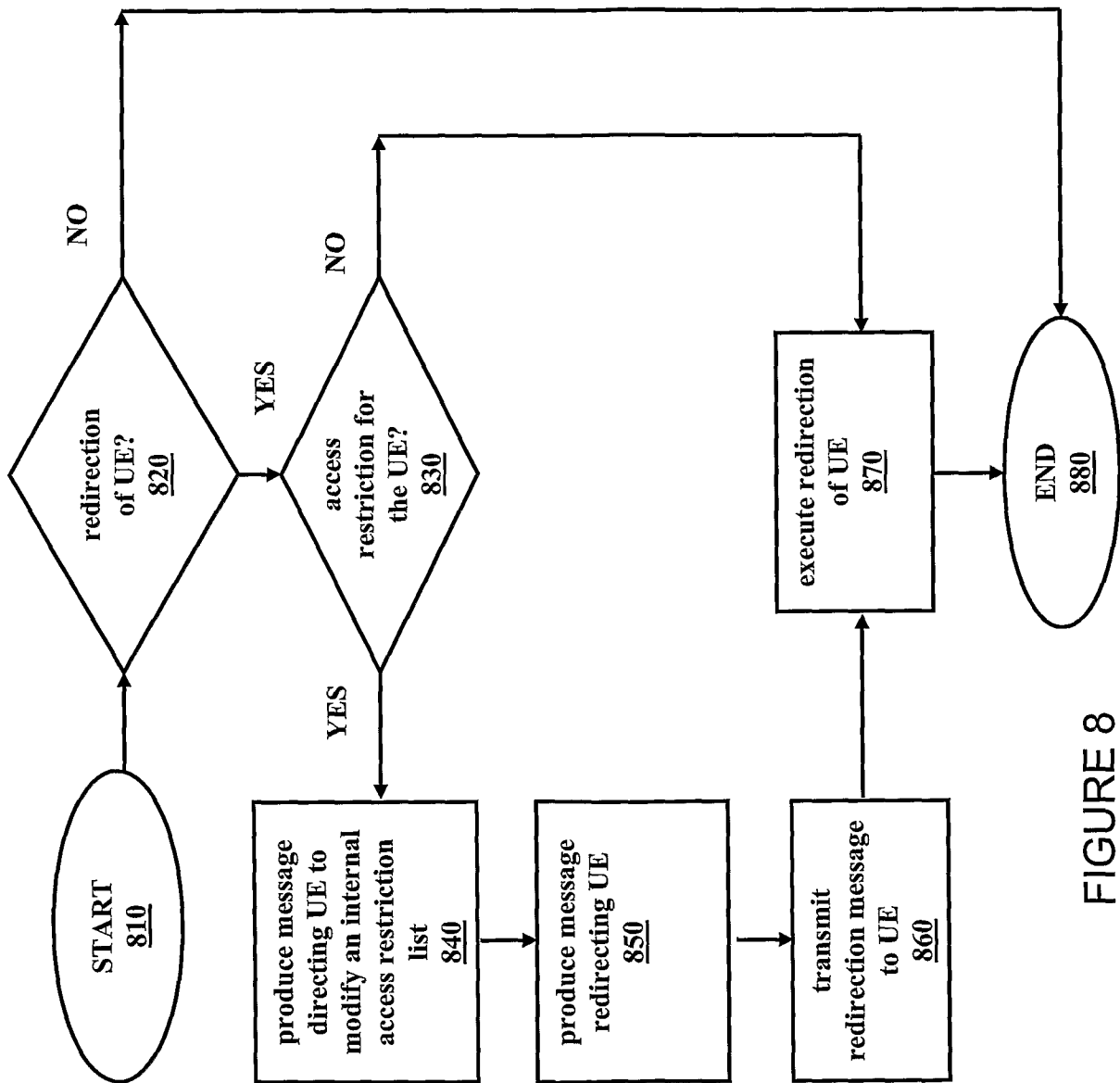


FIGURE 8

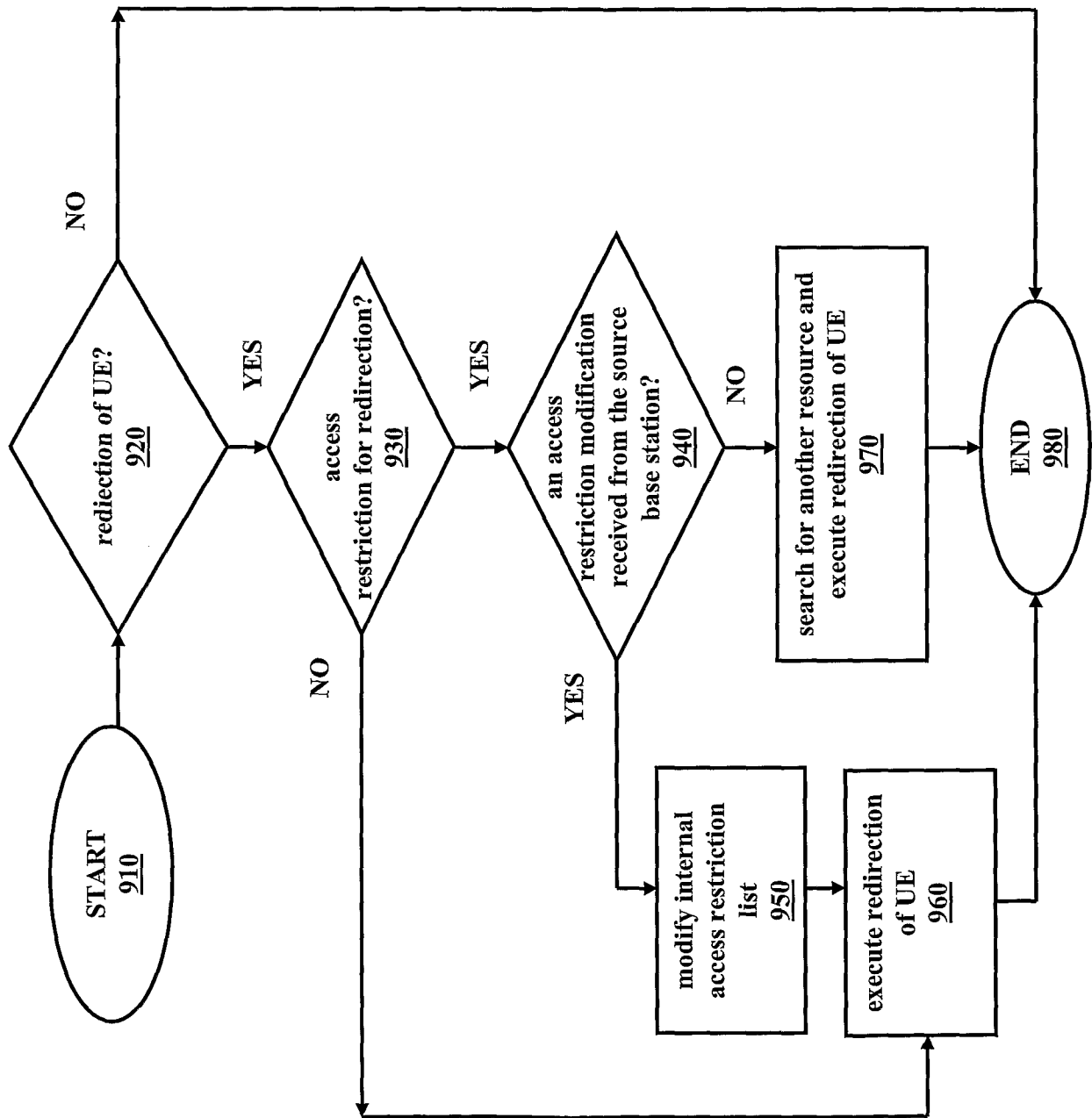


FIGURE 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2010/000649

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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: H04W

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009034076 A2 (NOKIA SIEMENS NETWORKS OY), 19 March 2009 (19.03.2009), claims 1-36, abstract, paragraphs (0001),(0005)-(0006), (0010)-(0018),(0025),(0037)-(0039) --	1-36
A	WO 2009022976 A1 (TELEFONAKTIEBOLAGET L M ERICSSON (PUBL)), 19 February 2009 (19.02.2009), figures 1-4, claims 1-34, abstract, paragraphs (0006)-(0027),(0048)-(0064) --	1-36
A	WO 2008134281 A2 (INTERDIGITAL TECHNOLOGY CORPORATION), 6 November 2008 (06.11.2008), figures 1-5, claims 1-42, abstract, paragraphs (0007)-(0016) --	1-36

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

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"&" document member of the same patent family

Date of the actual completion of the international search

5 July 2010

Date of mailing of the international search report

03-07-2010

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2010/000649

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008041937 A2 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 10 April 2008 (10.04.2008), page 3, line 8 - page 4, line 15, figures 1-3, abstract --	1-36
A	"LS on Area and Access Restrictions" 3GPP Draft; S2-074942_C1-072484-LS-out, 2007-10-25, 3rd Generation Partnership Project (3GPP), Mobile Competence Centre, whole document --	1-36
P,A	WO 2009044317 A2 (NOKIA CORPORATION), 9 April 2009 (09.04.2009), abstract, paragraphs (0004)-(0019) -- -----	1-36

International patent classification (IPC)**H04W 48/10** (2009.01)**H04W 48/16** (2009.01)**Download your patent documents at www.prv.se**

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