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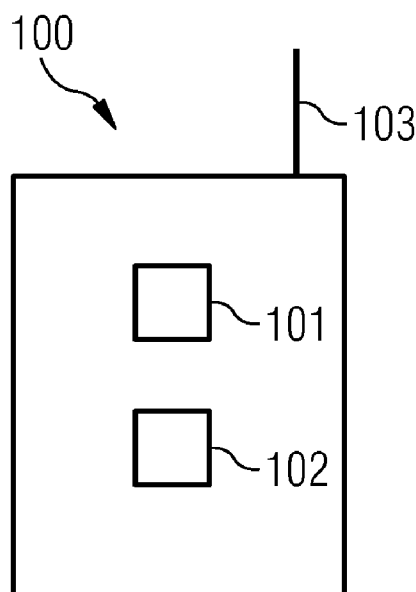
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(54) Title: METHOD, TERMINAL AND BASE STATION FOR SELECTING IN A TERMINAL A CELL FOR THE TERMINAL

**FIG 1**



(57) Abstract: A Method for indicating to a terminal (100) the presence of an accessible cell is described. The method comprises determining a first cell to which the terminal (100) is connected. The first cell is controlled by a first base station (200, 200'). The method further comprises providing terminal-specific restriction information for possible cell access to the first base station (200, 200') and receiving in the terminal (100) indication of the existence of an available second cell meeting the terminal-specific restriction information.

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Method, terminal and Base Station for selecting in a terminal  
a cell for the terminal

5    Technical field of the invention

The present invention relates to the technical field of  
communication networks, e.g. wireless communication networks.  
In particular the present invention relates to a method for  
10    indicating to a terminal the presence of an accessible cell,  
to a method for accessing a second cell by a terminal, to a  
method for providing an access parameter by a first Base  
Station to a terminal, to a method for providing an access  
parameter to a first Base Station by a second Base Station,  
15    to a method in a Base Station for signalling the availability  
of information about an available other cell, to a program  
element, to a terminal for selecting a cell for the terminal,  
to a Base Station for providing an access parameter to a  
terminal, to a Base Station for providing an access parameter  
20    to a first Base Station and to a signalling apparatus for  
signalling the availability of information about an available  
other cell.

Background of the invention

25    After the roll out of cellular networks and after reaching a  
high coverage with existing Base Stations, it may become of  
more and more interest to increase the capacity of the  
existing networks. One concept may define macro cells and  
30    home cells.

Macro cells commonly denote legacy cells, cells which already  
have been installed and which cover a large physical area.

35    Home cells may be cells which have a smaller footprint than a  
macro cell and thus may allow a fine planning of a coverage.

In other words, this may mean that a home cell, a pico cell or a femto cell may allow in a small area to provide capacity to provide this small area with the availability of mobile services.

5

Thus, a home cell may be used to increase within a macro cell at certain predefined areas the capacity. Such certain areas may be shopping malls, train stations, universities or private homes. Furthermore, franchise companies may employ  
10 home cells, to offer to their customers special mobile services when the customers are nearby physical locations of the shops, e.g. coffee shops. For example, such franchise companies may offer accessing a cellular network at reduced costs. Such value added services may increase the customer  
15 loyalty.

From the document "WiMAX® Forum network architecture, stage 3: Detailed protocols and procedures", release 1, version 1.2, 11 January 2008, from the WiMAX Forum, a network entry  
20 discovery and selection procedure may be known.

In the technical specification of 3rd generation partnership project, technical specification group radio access network, "Evolved Universal Terrestrial Radio Access (E-UTRA) and  
25 Evolved Universal Terrestrial Radio Access Network (E-UTRAN), Overall description; Stage 2", TS 36.600, Release 8, V8.5.0, 2008-05, an overview and overall description of the E-UTRAN radio interface protocol is provided.

30 In the document, "Technical specification group GSM (Global System for Mobile Communication)/EDGE (Enhanced Data Rates for GSM Evolution) radio access network, mobile radio interface layer 3 specification, radio resource control (RRC) protocol", TS 44.018 release 8, V 8.3.0, 2008-05, a  
35 specification is made for procedures used at the radio interface for Radio Resource Management (RRM).

In the document 3rd Generation Partnership Project, technical specification group GSM/EDGE radio access network, "General Package Radio Service (GPRS), Mobile Station (MS) - Base Station System (BSS) interface, Radio Link Control/Medium Access Control (RLC/MAC) protocol", TS 44.060, release 5, V5.6.0, 2003-04, from the 3rd Generation Partnership Project, specifies procedures for layers of the radio interface, the interface between the GSM/EDGE Radio Access Network (GERAN) and the Mobile Station (MS).

There may be a need to provide a more effective associating of a terminal with a mobile network cell.

#### Summary of the invention

According to an exemplary embodiment of the present invention, a method for indicating to a terminal the presence of an accessible cell, a method for accessing a second cell by a terminal, a method for providing an access parameter by a first Base Station to a terminal, a method for providing an access parameter to a first Base Station by a second Base Station, a method in a Base Station for signalling the availability of information about an available other cell, a program element, a terminal for selecting a cell for the terminal, a Base Station for providing an access parameter to a terminal, a Base Station for providing an access parameter to a first Base Station and a signalling apparatus for signalling the availability of information about an available other cell may be provided.

In an exemplary embodiment of the present invention, a method for indicating to a terminal the presence of an accessible cell may be provided.

The method may comprise providing terminal-specific restriction information for possible cell access to a first base station and receiving in the terminal an indication of

the existence of an available second cell, wherein the second cell may meet the terminal-specific restriction information.

5 In another exemplary embodiment the first base station may control a first cell.

In yet another exemplary embodiment the terminal may be connected to the first cell.

10 According to another exemplary embodiment of the present invention a method for accessing a cell or a second cell by a terminal may be provided. The method may comprise receiving in the terminal information about the presence of at least one cell or at least one second cell, displaying the  
15 information on the terminal, e.g. on a monitor of the terminal and receiving a trigger for starting searching an accessible cell or second cell.

In one exemplary embodiment the trigger may be a manual or  
20 mechanical operation of a user, e.g. pushing a button. In another exemplary embodiment the trigger may be an automatic trigger.

According to another exemplary embodiment of the present  
25 invention, a method for providing an access parameter by a first Base Station to a terminal may be provided. The method may comprise storing in the first Base Station an access parameter for at least one available second cell, wherein the first Base Station may control a first cell and wherein a  
30 second Base Station may control the second cell.

The method may further comprise receiving in the first Base Station terminal-specific restriction information for possible cell access for the terminal and selecting from the  
35 stored access parameter such an access parameter of available second cells, which second cells meet the terminal-specific restriction information.

The access parameter may be a plurality of access parameter, e.g. a list or a set of access parameter.

In other words, the terminal may inform the first Base  
5 Station about restrictions, rules or policies, which the terminal may have for accessing cells.

In one example, the method may further comprise selecting from the stored access parameter such access parameter of  
10 available second cells, which second cells may meet the terminal specific restriction information. The selected access parameter or location-specific information may be transmitted to the terminal.

15 According to another exemplary embodiment of the present invention, a method for providing an access parameter or at least one access parameter to a first Base Station by a second Base Station may be provided, wherein the method may comprise connecting the second Base Station to the first Base  
20 Station. The first Base Station may control a first cell and the second Base Station may generate or control a second cell. In one example the second Base Station may provide an access parameter for the second cell to the first Base Station.

25 In one example, the second cell may be overlaid by the first cell and the second Base Station may provide the access parameter to an administrative device inside the first Base Station or to a Closed Subscriber Group table in the first  
30 Base Station.

According to yet another exemplary embodiment, a method in a Base Station for signalling the availability of information about an available other cell may be provided, wherein the  
35 method may comprise sending an indication whether the Base Station may have information about an available other cell and/or sending an indication whether the Base Station is capable to provide an access parameter and/or sending an

indication that the Base Station may have detected at least one other cell in a predefined distance of the Base Station or nearby the Base Station. In an example an other cell or second cell may be determined in a predefined distance of the Base Station.

According to yet another exemplary embodiment of the present invention, program element may be provided, which program element, when being executed by a processor may be adapted to carry out at least one method selected from the group of methods consisting of the method for selecting in a terminal a cell for the terminal, the method for accessing a second cell by a terminal, the method for providing an access parameter by a first Base Station to a terminal, the method for providing an access parameter by a second Base Station to a first Base Station and the method in a Base Station for signalling the availability of information about an available other cell.

According to another exemplary embodiment of the present invention, a computer-readable medium may be provided, wherein the computer-readable medium may comprise program code, which program code, when being executed by a processor may be adapted to carry out at least one method selected from the group of methods consisting of the method for selecting in a terminal a cell for the terminal, the method for accessing a second cell by a terminal, the method for providing an access parameter by a first Base Station to a terminal, the method for providing an access parameter by a second Base Station to a first Base Station and the method in a Base Station for signalling the availability of information about an available other cell.

A computer-readable medium may be a floppy disk, a harddisk, an USB (Universal Serial Bus) storage device, a RAM (Random Access Memory), a ROM (Read Only Memory) and an EPROM (Erasable Programmable Read Only Memory). A computer-readable

medium may also be a data communication network, e.g. the Internet, which may allow downloading a program code.

According to another exemplary embodiment of the present invention, a terminal for selecting a cell for the terminal may be provided. The terminal may comprise a terminal controller device and a cell determining device.

The terminal controller device may be adapted for providing terminal-specific restriction information for possible cell access for the terminal. In an example the terminal controller device may also be adapted for determining a first cell to which the terminal may be connected. In another example, the terminal controller device may be adapted for determining a first cell to which the terminal may be connected.

In a particular exemplary embodiment of the present invention the cell determining device may be adapted for providing access parameters and/or other information such as CSG ID to a first base station in order for the first base station to construct a CSG table. The terminal may be able to provide access parameters and/or other information if the terminal may previously have detected the presence of the second cell.

The first cell may be controlled by a first base station or by a first base station controller.

The cell determining device may be adapted for providing the terminal-specific restriction information to the first base station and for receiving in the terminal indication of the existence of an available second cell meeting the terminal-specific restriction information.

According to another exemplary embodiment of the present invention a terminal for accessing a cell or a second cell, comprising a controller device and a displaying device may be provided.

The displaying device may be adapted for displaying the information on the terminal and the controller device may be adapted for receiving in the terminal information about the presence of at least one cell or of at least one second cell and for receiving a trigger for starting searching for an accessible cell or an accessible second cell.

In one particular exemplary embodiment of the present invention a trigger for starting searching for an accessible cell or an accessible second cell may not be needed since searching may start automatically.

According to another exemplary embodiment of the present invention, a Base Station for providing an access parameter to a terminal may be provided. The Base Station may comprise a controller device, and a storage device. The storage device may be adapted for storing in the Base Station an access parameter for at least one available second cell. In an example, the Base Station may comprise a cell controlling device, which may be adapted for controlling a first cell.

The controller device may be adapted for receiving in the Base Station terminal-specific restriction information for possible cell access for the terminal and for selecting from the stored access parameter such an access parameter of available cells or second cells, which cells or second cells may meet the terminal-specific restriction information.

In an exemplary embodiment of the present invention the Base Station may be a Base Station controller or the Base Station may comprise a Base Station controller. A Base Station Controller may be in GSM a BSC (Base Station Controller) and in UMTS a RNC (Radio Network Controller)

According to another exemplary embodiment of the present invention, a Base Station for providing access parameter to a first Base Station may be provided. The Base Station may

comprise a controller device, a cell controlling device and a connecting device.

5 The connecting device may be adapted to connect the Base Station to a first Base Station and the cell controlling device may be adapted for controlling a cell or a second cell.

10 The controller device may be adapted for providing access parameter for the cell or for the second cell to the first Base Station.

According to yet another exemplary embodiment of the present invention, a signalling apparatus for signalling the  
15 availability of information about an available other cell may be provided. The signalling apparatus may comprise a Base Station and a signalling device. The signalling device may be connected to the base station and the signalling apparatus may be adapted for sending an indication whether the Base  
20 Station has information about an available other cell and/or for sending an indication whether the Base Station may be capable to provide an access parameter and/or for sending an indication that the Base Station may have detected at least one other cell in a predefined distance of the Base Station.

25 Thus, information about a capability of a signalling apparatus or Base Station may be received and evaluated. Furthermore, the number of available home cells or CSG cells within the coverage of the Base Station may be provided.

30 Furthermore, better information about neighbouring cells to a terminal may be provided.

Since a cell may be generated or controlled by a Base  
35 Station, the terms cell and Base Station may be exchangeably used in this text. Thus, the terms cell and Base Station may be used in this text where appropriate, however may have the same meaning.

A Base Station may also mean a sub-system which may comprise multiple systems, e.g. a Base Station Transceiver (BTS) and a Base Station Controller (BSC).

5

A home cell may be a Closed Subscriber Group cell, i.e. a cell to which access may be restricted to a Closed Subscriber Group. Examples for a the location of Closed Subscriber group cells may be home areas, campuses (university or business), stores of a franchise company or coffee shop chains etc..

10

In other words, a CSG ID may be the subscription information, i.e. the CSG ID may be seen as a name, an address or an identifier for a defined CSG cell or group of CSG cells. In an example the cell may be geographically close to the Base Station, i.e. within a predefined distance. A CSG cell may be a cell which may only be accessible to subscribers of the corresponding CSG ID.

15

A CSG cell may have one or more CSG IDs associated with it. A terminal may have a subscription to zero or more CSGs meaning the terminal may access zero or more CSG cells with the corresponding CSG ID(s).

20

The home cell concept may propose to introduce a hierarchy between different cells covering substantially the same physical locations. As long as different physical parameter may be used to generate a cell, such as different frequencies, cellular networks may be operated in an overlay configuration.

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In order to coordinate the different technologies a coordination instance may be required. Thus, an idea of a macro cell / pico cell concept may be to use a macro cell as the coordinating instance of a plurality of pico cells, femto cells, home cells or CSG cells. Possibly, the footprint of a macro cell may cover or overlay the footprint of at least a part of a plurality of pico cells and/or home cells. Thus,

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the macro cell may be used as the administrating instance,  
which may control the access of a terminal to different  
cells. In particular, the controller of a base station  
spanning or generating a macro cell may be used as the  
5 administrator. The macro cell may be the umbrella cell for at  
least a part of a plurality of home cells.

In an example a CSG may apply also to UTRAN or other  
technologies , in particular in technologies allowing access  
10 control to network resources.

The home cell concept may also have been enriched with the  
proposal of Closed Subscribers Groups (CSGs). In this concept  
of CSG, access to a set of one or more cells, in particular  
15 to home cells or CSG cells, may be substantially permitted  
only for a predetermined set of UEs (User Equipment), mobiles  
or terminals. The permission may be a terminal-specific  
restriction information, e.g. based on subscription setting.  
Thus, the terminal-specific restriction information may not  
20 be known by the first base station. The home cells using UMTS  
("3G") and/or LTE technology may attract the interest of  
operators and manufacturers, since the coverage may be  
adapted to the shape of traffic. Thus, a more efficient  
offering of services and a more tailored service bouquet may  
25 be offered by an operator.

Of particular interest may be scenarios where the coverage of  
the home cell may overlap with the coverage of a macro layer  
or where the home cell coverage may form an intersection with  
30 the coverage of a macro layer of cells. If the home cell and  
the macro cell may adopt or employ the same radio access  
technology (RAT) these scenario may be particularly  
interesting. Examples for different RATs may be GERAN, UMTS,  
or LTE.

35

However, this may leave uncovered a deployment scenario that  
may arise, whereby in an example 3G (UMTS) home cells and/or

LTE home cells are overlapped by a macro cell using a different RAT, e.g. GERAN cells.

Thus, an idea of the invention may be seen in how to make a  
5 UE or terminal which may use, either in idle or connected  
mode, a macro cell using one particular RAT aware that home  
cells using another RAT may be available within the coverage  
area of the macro cell. In particular, the terminal may be  
interested in an information about relevant home cells,  
10 before the terminal may have to perform measurements, in  
order to determine the cells available in the neighbourhood  
of the terminal.

In particular, where the macro cell may be a GSM / GPRS /  
15 EDGE cell, and an accessible, available and/or allowed LTE or  
UMTS HNB (Home NodeB) may be available, users may get  
improved data rates from an LTE / UMTS cell and their mobiles  
may therefore be made aware of the existence of such cells.

20 At the same time, it may be considered that 'blind scanning'  
for such cells may consume significant power and may  
therefore be avoided.

Therefore, in an exemplary embodiment of the present  
25 invention a mechanism may be provided to indicate when and/or  
where and /or how a mobile may initiate scanning to search  
for home cells.

The macro Base Station or the terminal may be seen as the  
30 instances which may link information available at different  
places in the network, in order to reduce the effort by  
finding appropriate cells for connecting.

In order to prevent the effort for scanning cells, which with  
a high grade of probability may not be allowed to be accessed  
35 by the individual terminal, for providing cells for scanning  
to the terminal an 'a priori' knowledge may be used. In an  
example, not all home cells may be accessible to all

terminals e.g. due to the use of CSGs, and the fact that particular TAIs/LAIs may be not allowed for some Ues.

5 In another example, home cells may have much smaller coverage than the macro cell. This may be interesting, in cases where the terminal may move at a high speed.

10 In yet another example, storing of the location of all allowed home cells by the terminal may not be feasible if the number of allowed home cells may be very high.

15 Therefore, in an exemplary embodiment of the present invention a general technique may be provided to distribute information to terminals about home cells present within a macro cell. Thus, in an exemplary embodiment of the present invention enhancing the home cell detection procedure may be suggested.

20 The techniques disclosed for home cells of different RAT as the macro cells may also be applied to home cells of the same RAT as the macro cell.

25 In one example, unnecessary battery consumption, unnecessary measurement reports, and degradation of ongoing connections may be reduced. Degradation of ongoing connections or of established connections may be caused by the terminal needing processing power to report measurements and to decode system information for cells which cells the terminal will not be able to access. The processing power may not be used for  
30 maintaining the established connection. Degradation of ongoing connections may be caused by the terminal needing to temporarily suspend the ongoing connection in order to perform measurements, e.g. signal strength measurements, or decode system information, or to report signal strength  
35 measurements.

Intra-RAT mobility may concern handing over a terminal between a home cell and a macro cell of the same RAT or the

terminal autonomously performing reselection between a home cell and a macro cell of the same RAT.

Inter-RAT mobility may concern handing over a terminal  
5 between a home cell and a macro cell of different RAT. or the terminal autonomously performing reselection between a home cell and a macro cell of the same RAT.

According to an exemplary embodiment of the present invention  
10 handing over and/or reselecting from macro cell to HNB may be provided. Thus, in a particular exemplary embodiment incoming mobility towards the HNB may be controlled by a macro Base Station.

15 Thus, in an exemplary embodiment of the present invention inter-RAT IDLE mode mobility may be provided.

Thus, a high amount of high layer channel decoding may be prevented, e.g. required in order to decode the SIBs.  
20 Therefore, unnecessary battery consumption may be prevented caused by decoding in an IDLE mode. Furthermore, degradation of ongoing connections in ACTIVE mode caused by decoding may also be prevented.

25 The power consumption and decoding may be an issue common to all RATs. All RATs may need measurements and thus terminals using any RAT may be subject to increased battery consumption and ACTIVE mode service interruptions. However, the technologies that may sense this impact the most may be the  
30 technologies where the user plane bit rates may be low. For services with low bit rates any service interruption due to the need of measurements may perceived as a QoS (Quality of Service) degradation.

35 QoS degradation may happen in the case of inter-RAT mobility between GERAN and 3G/LTE, where a terminal in GERAN ACTIVE mode may have to interrupt its data reception in order to scan for available CSGs and possibly handing over to them

either under the control of the network or under autonomous cell reselection in packet transfer mode.

Therefore, in an exemplary embodiment of the present invention enhancing of inbound mobility, i.e. mobility  
5 towards home cells or handover to home cells, may be based on providing location-specific information or providing access parameter of an available second cell or of a home cell meeting terminal-specific restriction information to a  
10 terminal, depending on which macro cell the terminal may currently be within coverage of.

For example home cells are a subset of CSG cells.

15 An idea of the invention may be seen in offering a method to inform the terminal about a physical access parameter, e.g. the Physical ID or a list of Physical IDs used by home cells, which may be accessible for the terminal. This may provide a much more efficient home cell search based on Physical ID  
20 scanning rather than BCCH (Broadcast Control Channel) decoding. A physical layer scanning may save battery power and may have smaller impact on QoS due to measurements and reporting on service bandwidth compared to BCCH decoding. Furthermore, erroneous attempts of camping on non accessible  
25 home cells may be reduced.

According to an exemplary embodiment of the present invention the method indicating to a terminal the presence of an accessible cell may further comprise receiving in the  
30 terminal access parameter, in particular physical access parameter, of an available second cell, which cell may meet the terminal-specific restriction information.

Thus, the probability of connecting to the cell by scanning  
35 the cell may be increased.

The terminal may determine that the terminal may be allowed to access a cell whose access parameters have been provided

by the first base station without needing to decode the system information from that cell.

5 According to another exemplary embodiment of the present invention, the method for indicating to a terminal the presence of an accessible cell may further comprise scanning the received access parameter.

10 In a further exemplary embodiment the received access parameter may be a frequency and/or a scrambling code.

The received access parameter may be physical identifier. Receiving physical identifier as access parameters, such as a Physical Cell identifier, may allow to determine the  
15 accessibility of a corresponding cell. In other words, the fact that the terminal may have received a physical parameter in itself may indicate that the terminal may be able to access the cell.

20 Knowledge of the access parameter may be sufficient to permit measurements of the second cell in order to determine whether or not handover or cell reselection towards that cell may occur.

25 The access parameter itself may not provide sufficient information to permit the terminal to determine whether the terminal may be allowed to access that cell, in other words, whether the terminal may have a subscription to access that cell.

30 According to another exemplary embodiment of the present invention, the second cell may be overlapped by the first cell.

35 In other words, the first cell may overlap the second cell. Overlapping of cells may mean that a footprint of the second cell at least partially may lie within the footprint of the first cell. Overlapping the second cell with the first cell

may allow to increase in the location of the second cell the capacity within the first cell.

Furthermore, overlapping the second cell with the first cell  
5 or positioning the second cell at least partially within the first cell may allow to provide access within the second cell via another operator than in the first cell. For example, the other operator may be a franchise company or coffee shop which may want to allow a group of customers or the group of  
10 premium customers to access a mobile network at reduced rates while the customers may be in the shop of the franchise company.

According to another exemplary embodiment of the present  
15 invention, the second cell may be generated or controlled by a second Base Station and the second Base Station may be a home Base Station which may generate or control a home cell or a CSG cell.

20 The first Base Station may be a macro Base Station and thus, may generate or control a macro cell.

A home Base Station may be a Base Station apparatus which may have a smaller size and a lower weight than a macro Base  
25 Station. For example, a home Base Station may be installed in a private property or home and may provide access for family members within their home. In an example a home Base Station may have the size of a so-called "pizza box" and may be supplied by home power supply, such as 110 V (Volt) AC or 230  
30 V AC. For example, a home Base Station may comprise a device like a hook for mounting the home Base Station at the wall, and may have a weight of less than 1 kg, in the range of 500 g to 1.5 kg (kilogram) or of less than 5 kg.

35 A macro Base Station may classify or group terminals which may be connected to the macro Base Station and the macro Base Station may decide which terminal may be connected to a home Base Station.

In another example, the macro Base Station may provide information to the terminal which information may allow the terminal to decide to which cell the terminal may connect.

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Since the home Base Station may differ in size from the Base Station apparatus itself and the size of a generated or controlled footprint, a home Base Station may also be called pico Base Station or femto Base Station. A pico Base Station may control a pico cell and a femto Base Station may control a femto cell.

According to another exemplary embodiment of the present invention, the first cell and the second cell may adopt or may employ a different Radio Access Technology (RAT). Furthermore, the first cell and/or the second cell may adopt a different radio access technology than a macro Base Station. Adopting different radio access technologies may allow inter-RAT handover, i.e. handover of terminals between cells, in particular a macro cell and a micro cell, driven by different technologies.

The first cell and the second cell may adopt the same radio access technology. Furthermore, the first cell and/or the second cell may adopt the same radio access technology as a macro Base Station. Thus, intra-RAT mobility may be provided, i.e. handover between a macro Base Station and a home Base Station may be made, wherein the macro Base Station may employ the same technology as the home Base Station.

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According to another exemplary embodiment of the present invention, the RAT may be at least one technology selected from the group consisting of GERAN (GSM EDGE Radio Access Network), Universal Mobile Telecommunication Systems (UMTS) and Long-Term Evolution (LTE).

35

Thus, a mobile terminal which, may support at least one of the different radio access technologies may be independent of

the technology when accessing a home cell. In other words, an operator may operate a home cell employing one technology and another operator may operate a home cell employing another technology. Being able to support different technologies may  
5 allow the macro Base Station to handover a terminal to an appropriate home cell.

According to another exemplary embodiment of the present invention, the terminal specific restriction information may  
10 comprise at least one restriction information selected from the group consisting of a Closed Subscriber Group identifier (CSG) or a CSG indicator, a closed subscriber group white list, a dedicated closed subscriber group frequency, a location of the terminal, a previously recorded location  
15 information, a speed of the terminal, a radio access type capability of the terminal, a frequency band on which the terminal may operate, a prohibited Tracking Area Identifier (TAI ID), a previously recorded TAI, a prohibited Location Area Identifier (LAI ID), Routing Area Identifier (RAI ID), a  
20 Global Cell Identifier (GCI), a previously recorded LAI, a time before next request, a macro cell context, a home NodeB (HNB) Hardware Identifier (HW ID), and a Global Positioning System (GPS) location.

25 The terminal-specific restriction information may comprise policies or rules, in particular access rules. The terminal-specific restriction information may comprise a state of the terminal, such as speed or location, a physical access  
parameter, such as a frequency or Phy ID and/or an access  
30 control information, such as a CSG. The terminal-specific restriction information may be an information in addition to the subscriber/user identifier e.g. IMSI (International Mobile Subscriber Identity).

35 This physical access parameter may be on a physical layer, wherein access control information may be on a higher logical layer.

The terminal-specific restriction information may allow a Base Station to perform filtering based on the restrictions indicated by the terminal-specific restriction information. Therefore, the terminal-specific restriction information may  
5 allow to find cells, which may match the terminal in its actual condition.

The terminal specific restriction information may comprise policies, rules or restrictions for each single terminal  
10 which may define requirements which may have to be met before the terminal may access a cell.

Generally, the terminal-specific restriction information or identifier may be single values or lists of a plurality of  
15 values.

Accessing a cell may mean accessing a corresponding Base Station generating a cell. Some home Base Station may not be accessed by any arbitrary individual terminal. Access to a  
20 home Base Station may be reserved for a close subscriber group. For example, the owner of a home Base Station may want to control the traffic which may flow into a network and thus may restrict the access to a closed subscriber group.

25 Having access policies or access requirements may allow to restrict the access to a predefined group of persons or subscribers. A coffee shop may have a closed subscriber group which may be defined as premium customers or customers of the coffee shop.

30 Providing such terminal-specific restriction information may allow to provide to a first Base Station or a macro Base Station "a priori" knowledge about the capability of the terminal, to which Base Station the terminal may be  
35 connected. This may allow the macro Base Station to select appropriate home Base Stations for the terminal. In other words, by having "a priori" knowledge about the capabilities or access rights, rights or privileges for a certain

terminal, the macro Base Station may decide which information about home cells the macro Base Station may provide to the terminal as a response to providing terminal-specific restriction information.

5

Having the corresponding information may also allow the terminal to decide about cells to which the terminal may connect.

10 A closed subscriber group identifier may be an identifier which may allow differentiating between different closed subscriber groups. Examples for closed subscriber groups may be a group of customers of a franchise company, a group  
15 premium customer, a group of gold customers or similar classification of subscribers or customers, employees of a particular company, or staff and/or students at a particular university or school.

A Closed Subscriber Group white list may be a list of Closed  
20 Subscriber Groups which a terminal may be subscribed to.

A dedicated closed subscriber group frequency may be a frequency dedicated to one or more certain closed subscriber groups. In other words, this may mean that there could be a  
25 frequency on which substantially only CSG cells exist. Such a frequency may not be indicated in broadcast system information, so the terminal may have reduced possibilities to discover the existence of the CSG cell without scanning or without may having some other information.

30

In other words, providing the access parameter may prevent "blind" scanning and longsome searches.

A location of the terminal or a GPS location may be the  
35 position of the terminal or of the user of a terminal. Having the position of a terminal may allow the macro Base Station to determine whether the terminal may connect to a close home cell near by the terminal. Having knowledge about the

location the macro Base Station may also decide not to connect a terminal to a corresponding home cell since the Base Station may detect that the distance between the terminal and the corresponding home cell may be too far in order to provide appropriate Quality of Service (QoS).

Previously located information may be history information, for example when a terminal already may have been connected to a certain home cell, the terminal may store and provide the information that the terminal already successfully may have been connected to the corresponding home cell. Such a history information may indicate to the macro Base Station that access to the corresponding home cell may be possible.

Providing the speed of the terminal may allow the macro Base Station to determine the probability of the terminal accessing a home cell. For example if the expected duration of stay due to a speed of the terminal may be lower than the time needed to connect to the home cell the macro Base Station may decide not to provide access information of such a home Base Station or home cell.

Thus, according to an exemplary embodiment the macro Base Station may be enhanced with intelligence, such that the macro Base Station may decide about the applicability of connecting to a plurality of home cells.

A radio access type capability or frequency band may select of a group of available home cells corresponding cells appropriate for an access type or frequency band of the terminal, for example if the terminal only supports the GSM technology the macro Base Station (BS) may decide not to provide UMTS based home cell access information to the terminal.

Thus, for prohibited TAI/LAI, the BS would send information only about cells which may not have that TAI/LAI. If the terminal may previously have been connected to a particular

TAI, it may be applicable to access the previously recorded TAI, so that cells with that/those previously recorded TAI(s) may be sent.

5 The time before next request may be provided in order to give the macro Base Station the possibility to decide whether it may be appropriate to connect the terminal to a corresponding home cell if the situation may be changed after the next request.

10

A home NodeB hardware identifier (HNB HW ID) may be provided in order to prohibit that the terminal may access to a home cell generated by a Base Station having corresponding HNB HW ID.

15

A macro cell context may be a subset of location information. A macro cell context may be the set of macro cells which may be "visible" to the terminal. Based on this, the first BS may estimate where the terminal may be located and may  
20 provide second cell information based on this.

According to yet another exemplary embodiment the received access parameter may be an access parameter, which may allow the terminal a fast and/or substantially impact-less scanning  
25 of a corresponding second cell.

Thus, physical access parameter may be provided.

According to another exemplary embodiment of the present  
30 invention, the received access parameter or the location-specific information may comprise at least one access parameter selected from the group consisting of a physical cell identifier, a centre frequency, a scrambling code, a base station identity code, a closed subscriber group  
35 identifier, a closed subscriber group indicator bit, a tracking area identifier, a location area identifier, a routing area identifier and a neighbour cell list.

Information about home cells may not be included in any neighbour cell list broadcasted by macro cells due to the possibly high number of home cells deployed within the coverage area of a macro cell.

5

In other words, a Base Station or macro Base Station may have a plurality of possibilities of home cells which may be provided to a terminal requesting for joining a home cell. Thus, the macro Base Station may need to reduce the number of possibilities of home cells which the macro Base Station may provide to the terminal or which the macro Base Station may decide to connect the terminal to. Thus, the macro Base Station may use an 'a priori' knowledge about capabilities, restrictions, policies or rules for the terminal to may have a criterion to reduce the number of provided home cells.

Identifiers associated with a home cell may be a physical cell identifier, a CSG indicator, a CSG ID, a TAI ID, a LAI ID, a TAI, a LAI or a RAI. A physical cell identifier in an example may be a physical layer cell ID for E-UTRAN or a scrambling code for UTRAN.

A CSG indicator may be a one bit field which may specify if a corresponding cell may be accessible only to one or more closed subscriber groups, a CSG indicator may be employed in LTE.

A CSG ID may be a unique identifier for a corresponding CSG, which may allow to identify a CSG. A CSG ID may be used in LTE or UMTS. A TAI may be used in LTE and a LAI and/or RAI may be used in UMTS and/or GSM.

The physical cell identifier may be an identifier which may rapidly be decoded by a terminal. The physical cell identifier thus, may be decoded, substantially without impacting the performance of any ongoing connection, i.e. an established connection. In particular the quality of a connection may be not degraded by consuming time for

decoding a physical cell identifier. Other information such as CSG indicator, CSG ID, LAI, TAI, or RAI may be transmitted within a System Information Block (SIB), which may require considerable time to decode and read.

5

The physical layer information, which may be provided as the access parameters from the first base station, may be used to easily identify the transmissions of the second cell and to perform measurements (e.g. of signal strength) for that cell.

10 For example, for GERAN, the centre frequency of the BCCH carrier may be identified and measured. In another example for UTRAN, the centre frequency and scrambling code may be identified and measured, and for LTE, the centre frequency and physical layer cell ID may be identified and measured.

15 The terminal may either report these measurements to the first base station or use these measurements to determine whether reselection to the CSG cell should occur. Reporting the measurements to the first base station may result in network controlled handover being initiated.

20

Preventing a terminal or an UE (User Equipment) from trying to decode SIB blocks of cells, which cells may not be allowed to access, may help to maintain a connection. Decoding of SIB blocks may also be a waste of battery power and thus, having  
25 "a priori" knowledge about home cells which a terminal may connect with a high probability may help to prevent wasting of battery power and may help to extend the working time of a terminal.

30 In another exemplary embodiment of the present invention, receiving access parameter of the available second cell meeting the terminal-specific restriction information may comprise receiving an indication that at least one second cell, which may meet the terminal specific restriction  
35 information, may exist. Having the information that such information may exist in the macro Base Station may allow requesting the access parameter associated with the at least one second cell from the first Base Station.

By asking the first Base Station whether information about a second cell may exist in the Base Station may allow reducing the bandwidth which may be used for a communication between the terminal and the first Base Station. In a case, where the terminal may receives the information that no information about a second cell may exist in the first Base Station, the terminal may prevent sending restriction information or a list of restriction information. Thus, by for example only receiving a single bit or a single flag indicating, that no information may be available in the first base station may prevent sending a complete list of information.

In another exemplary embodiment of the present invention, the method may further comprise receiving in the terminal from the first Base Station an indication that the first Base Station may have information about an available second cell.

Based on this, the terminal may search for home cells instead of requesting access parameter from the first base station. The terminal may conduct the search when the base station may not indicate support of the home cell table and/or when there may be relatively few home cells present.

By receiving an indication, for example a flag, within a message indicating, that the first Base Station may be capable of providing information about available second cells may inform the terminal that the first Base Station to which the terminal may be connected may support a home cell table. In other words, receiving the indication that the first Base Station may have information about an available second cell may motivate the terminal to send the terminal specific restriction information to the corresponding first Base Station.

The terminal may connect to a legacy Base Station or to an old Base Station which may not support a feature of providing information about an available second cell. Thus, before

sending any information the terminal may receive or request from the base station information, whether the corresponding base station may support the feature of providing information about an available second cell. This information may prevent  
5 the terminal to send information which may not be answered by the Base Station. Thus, bandwidth and/or power may be saved.

According to yet another exemplary embodiment of the present invention, the method may further comprise using for  
10 providing the terminal specific restriction information at least one channel selected from the group of channels consisting of a Packet Associated Control Channel (PACCH), a Slow Associated Control Channel (SACCH) and a Fast Associated Control Channel (FACCH). An administration or management  
15 channel may such be provided. A management channel may be established over a wireless or a wire bound link.

Receiving in the terminal information about the presence of at least one second cell may allow a user to decide trying to  
20 connect to the second cell. For interfacing with a user a display may be provided. A user may trigger a search for accessible second cells by manually triggering such a search.

In an example, the number of available cells may be provided.  
25

A terminal may use channels which may usually be established between the terminal and a corresponding first Base Station. Thus, no new channel may have to be defined or may have to be established in order to exchange information about access  
30 parameter of available second cells between the first Base Station and the terminal.

The channels may also be used for receiving the access parameter.  
35

In a further exemplary embodiment of the present invention, in the method for providing an access parameter by a first Base Station to a terminal, at least one second cell may be

made available to the first Base Station by connecting the at least one second Base Station to the first Base Station and by receiving in the first Base Station access parameter for the at least one available second cell.

5

Furthermore, access parameter may be provided to the first base station by a further terminal, which may connect to the first Base Station and provide access parameter.

10 The access parameter for the at least one available second cell may be inserted in a home cell table or a CSG table and inserting the access parameter for the at least one available second cell in the home cell table may indicate that the second cell be available. In other words, the second cell may  
15 be connected to the first cell or may be associated with the first cell in order to allow the first cell to administrate the second cell. For example, the first cell may decide which terminal access the second cell.

20 According to another exemplary embodiment of the present invention the method may further comprise receiving in the first Base Station access restriction information.

Access restriction information may be information used for a  
25 filter, e.g. terminal-specific restriction information. Thus, access restriction information may be provided as well as the access parameter.

According to yet another exemplary embodiment of the present  
30 invention, the access parameter for the at least one available second cell may comprise at least one access parameter and/or access control parameter selected from the group of parameter consisting of a CSG indicator, a CSG ID, a dedicated CSG frequency, a location of a second Base Station,  
35 a RAT, a frequency band on which the second Base Station can operate, a TAI, a LAI, a GCI, a neighbour cell list and a HNB HW ID.

These parameters may be associated with a second cell which cell may be accessed by the terminal with a high probability and for a predefined time.

5 For example, the macro Base Station may detected that the terminal may have stood for a predefined time in the area of a home cell. Thus, the macro Base Station may predict that the terminal with a high probability may stay in future in this area. Thus, a corresponding home cell may be offered to  
10 the terminal to connect to.

According to another exemplary embodiment of the present invention, the method may further comprise storing the access parameter in a Home Cell Table or a Closed Subscriber Group  
15 table or a CSG table.

A Home Cell Table may be a list of substantially all determined available second cell. The Home Cell Table may accelerate accessing parameters of second cells which may be  
20 available.

The CSG Table in particular may comprise access parameter, i.e. physical access parameter, and access control parameter, i.e. logical access parameter. Thus, the Base Station may  
25 filter the CSG Table in accordance with the terminal-specific restriction information for possible cell access, which may be provided by a terminal.

Tables thus may exist in the terminal, in the second base  
30 station and in the first base station. The first base station may use the CSG table in order to match the tables and in order to provide appropriate access parameters for the terminal.

35 A terminal may also conduct a matching of the tables in order to find appropriate access parameter.

The appropriate access parameter may be a sub-group or a sub-table of the CSG table.

5 According to another exemplary embodiment of the present invention, the method may further comprise sending an indication that the first Base Station may have information about an available second cell.

10 According to another exemplary embodiment of the present invention the method may comprise sending an indication that the first Base Station may have detected at least one second cell in a predefined distance of the first Base Station, i.e. nearby the first Base Station. Thus, the method may further comprise detecting at least one second Base Station in a  
15 predefined distance to the Base Station or detecting a second cell nearby the first Base Station

In a particular exemplary embodiment the information may be sent on a regular basis.  
20

Thus, the first Base Station may indicate to the terminal, connected to the first Base Station, or not yet connected to the first Base Station that it may be useful trying to send terminal specific restriction information to the first Base  
25 Station, because as an answer access parameter of an available second cell meeting the terminal specific restriction information may be expected.

The message may comprise information about the number of  
30 available second cells. Thus, receiving an information that a particular base station may have an empty CSG table may prevent a terminal to send the terminal-specific information to the Base Station.

35 According to another exemplary embodiment of the present invention, the method may comprise receiving update information for the at least one access parameter.

Thus, upon making amendments in the second cell, the amendments may be also made available in the first Base Station, e.g. in a Home Cell Table or in a CSG Table of the first Base Station. The amended information may be provided  
5 to the terminal.

According to another exemplary embodiment of the present invention the method for providing an access parameter by a first Base Station to a terminal may comprise selecting from  
10 the stored access parameter, e.g. in a CSG Table, at least one access parameter selected from the group consisting of a Physical Cell Identifier, a centre frequency, a Closed Subscriber Group Identifier, a Closed Subscriber Group indicator Bit, a Tracking Area Identifier, a Location Area  
15 Identifier, a Routing Area Identifier, a Neighbour Cell List, a base station identity code and a scrambling code.

Thus, physical access parameter may be generated from the CSG Table in order to provide the physical parameter to a  
20 terminal.

According to another exemplary embodiment of the present invention, the method may further comprise filtering the stored access parameter, in order to gather access parameter  
25 of available second cells, which second cells may meet the terminal specific restriction information.

Filtering may allow quickly accessing information stored in a home cell table.  
30

According to another exemplary embodiment of the present invention, in the method for providing access parameter to a first Base Station by a second Base Station, the access parameter may comprise at least one access parameter for the  
35 second cell selected from the group of access parameter consisting of a CSG ID, a CSG indicator bit, a dedicated CSG frequency, a location of a second Base Station, a RAT, a

frequency band on which the second Base Station may operate, a TAI, a LAI, a GCI, a neighbour cell list, and a HNB ID.

5 According to yet another exemplary embodiment of the present invention, the method may further comprise providing the access parameter upon at least one of powering up the second Base Station and updating the second Base Station.

10 Thus either after switching on the second Base Station, the second Base Station may try to connect to a higher layer macro Base Station and to provide access parameter to the macro Base Station. Furthermore, after making amendments within the second Base Station, the second Base Station may also try to inform the macro Base Station about these  
15 amendments in order to provide update information about the second Base Station to a terminal.

According to yet another exemplary embodiment of the present invention, the method may further comprise sending an  
20 indication whether the Base Station may have information about the second cell to at least one other Base Station and/or sending an indication whether the Base Station is capable to provide an access parameter.

25 Thus, other Base Stations may use information about the second cell, in particular access parameter in order to update neighbour lists. These neighbour lists may be provided to a macro Base Station or to a terminal.

30 Exemplary embodiments of the present invention have been described with reference to a method for indicating to a terminal the presence of an accessible cell, to a method for accessing a second cell by a terminal, to a method for providing an access parameter by a first Base Station to a  
35 terminal, to a method for providing an access parameter to a first Base Station by a second Base Station, to a method in a Base Station for signalling the availability of information about an available other cell, to a program element, to a

terminal for selecting a cell for the terminal, to a Base Station for providing an access parameter to a terminal, to a Base Station for providing an access parameter to a first Base Station and to a signalling apparatus for signalling the availability of information about an available other cell. Features described with reference to one exemplary embodiment may also apply for other exemplary embodiments.

It has also to be noted that exemplary embodiments of the present invention and aspects of the invention have been described with reference to different subject-matters. In particular, some embodiments have been described with reference to apparatus type claims whereas other embodiments have been described with reference to method type claims. However, a person skilled in the art will gather from the above and the following description that unless other notified in addition to any combination between features belonging to one type of subject-matter also any combination between features relating to different subject-matters in particular between features of the apparatus claims and the features of the method claims may be considered to be disclosed with this application.

These and other aspects of the present invention will become apparent from and elucidated with reference to the embodiments described hereinafter.

Exemplary embodiments of the present invention will be described in the following with reference to the following drawings.

#### Brief description of the drawings

Fig. 1 shows a block diagram of a terminal according to an exemplary embodiment of the present invention.

Fig. 2 shows a block diagram of a macro Base Station for providing access parameter to a terminal according to an exemplary embodiment of the present invention.

5 Fig. 3 shows a home Base Station for providing access parameter to a macro Base Station according to an exemplary embodiment of the present invention.

10 Fig. 4 shows a signalling apparatus for signalling the availability information about an available other cell according to an exemplary embodiment of the present invention.

15 Fig. 5 shows a message flow diagram for receiving in a terminal access parameter of an available second cell meeting the terminal-specific restriction information according to an exemplary embodiment of the present invention.

20 Fig. 6 shows a Home Cell Table according to an exemplary embodiment of the present invention.

Fig. 7 shows a message flow diagram for receiving in a terminal access parameter of an available second cell meeting terminal specific restriction information applicable for  
25 different radio access technologies according to an exemplary embodiment of the present invention.

Fig. 8 shows a network diagram of a communication network according to an exemplary embodiment of the present  
30 invention.

Fig. 9 shows a message flow diagram for sending an indicator on availability of access information by a base station to a terminal according to an exemplary embodiment of the present  
35 invention.

Fig. 10 shows a message flow diagram for sending an indicator on availability of access information by a base station to a

terminal and for using a central server according to an exemplary embodiment of the present invention.

## 5 Detailed description

The illustration in the drawings is schematic. In different drawings, similar or identical elements are provided with the same reference numerals.

10

Fig. 1 shows the terminal 100, the mobile terminal 100, the UE 100 or the MS 100. The terminal 100 comprises the terminal controller device 101 and the cell determining device 102.

15 The terminal controller device 101 is adapted for determining a first cell to which the terminal is connected. Furthermore, the terminal controller device 100 may determine information about a macro cell, in the coverage of which macro cell the terminal is located. The terminal 100 for example uses  
20 antenna 103 to connect to a first cell (not shown in Fig. 1).

The cell determining device 102 is adapted for providing terminal-specific restriction information to the first cell or to the first Base Station. The terminal specific  
25 restriction information may be stored in a list, or in a memory within the terminal 100. The terminal specific-restriction information comprises information for the terminal 100, which information determines to which cells the terminal 100 is allowed to connect. In addition, the terminal  
30 specific restriction information may comprise information about the status of the terminal 100, such as a speed of the terminal or a location of the terminal 100.

Furthermore, the terminal-specific restriction information  
35 may comprise environmental information or status information of the terminal 100 such as speed or location.

Connecting to the first Base Station may also comprise only establishing a control channel to the first Base Station.

5 The cell determining device 102 sends the terminal specific restriction information via antenna 103 to the first Base Station and receives as an answer an access parameter, e.g. an physical access parameter or a list of physical access parameter of an available and accessible second cell, which  
10 information. The terminal specific-restriction information may be provided as a list of access parameter. The access parameter received by the terminal 100 may be tailored to the terminal 100 and an actual state of the terminal 100.

15 Fig. 2 shows the Base Station 200, the first Base Station 200 or the macro Base Station 200 comprises the controller device 201, the cell generating device 202 and the storage device 203. The controller device 201, the cell generating device 202 and the storage device 203 are connected with each other.  
20 The storage device may comprise a data base 203' for storing a Home Cell Table or a CSG Table.

The storage device 203 is adapted to store access parameter, i.e physical access parameter and access control parameter,  
25 for at least one available second cell. The controller device 201 allows to connect a terminal to the first cell and for receiving in the Base Station terminal specific restriction information for possible cell access for a terminal.

30 Furthermore, the controller device 201 allows to administrate home cells or home Base Stations (not shown in Fig. 2) connected to the controller device 201.

The controller device 201 selects from the stored access  
35 parameter of available second cells, such access parameter belonging to those second cells meeting the terminal specific restriction information. The controller device 201 further allows to transmit the selected access parameter of available

second cells to the corresponding terminal 100. The second cell 200 can be connected to the first Base Station.

Another Base Station 300, which may be a standard Base Station adapted or retrofitted to provide access parameter to a first Base Station, is shown in Fig. 3. This other Base Station 300, the second Base Station 300 or the home Base Station 300 comprises a controller device 301, a cell generating device 302 and a connecting device 303. The connecting device is adapted to connect the Base Station 300 to a first Base Station (not shown in Fig. 3). The Base Station 300 provides, as soon as it is connected with a macro Base Station 200 access parameter for the second cell to the macro Base Station 200. Thus, the macro Base Station 200 or the first Base Station 200 may receive automatically triggered or manually triggered information about connected second cells or connected home cells, which then can be administrated by the macro Base Station 200.

Fig. 4 shows the signalling apparatus 400 wherein the signalling apparatus may comprise within one single housing the Base Station 401 and a signalling device 402. The signalling device 402 is adapted to determine whether the signalling apparatus is able to provide an indication and/or whether the Base Station has information about an available other cell.

Thus, an existing legacy Base Station 401 may be retrofitted with a signalling device 402 in order to prevent, that a terminal tries to send terminal-specific information to a legacy Base Station. Thus, the signalling device 402 may be used as a shelter to prevent receiving requests, which the bases station 401 may not be able to process.

The signalling device may be an add-on device for an existing base station, in order to enable the base station to broadcast indicators, such as indicators showing that the Base Station, i.e. the signalling apparatus, can support

providing access parameter. Thus, the signalling apparatus may be a base station comprising a signalling device. The Base Station or the Base Station function may be in a common housing with the signalling device.

5

Further more, the Base Station 400 may be an enhanced Base Station, which may allow to react to terminal-specific information. This capability may also be signalled by the signalling device 402.

10

Fig. 5 shows the terminal 100 or multimode UE 100, the home Base Station 300 or HNB 300 and the macro Base Station 200, in particular a GERAN Base Station 200 which work as a macro Base Station. The terminal 100, the HNB 300 and the GERAN BSS 200 may be located at places shown as lines in Fig. 5. The time is shown by arrow 502. In particular, Fig. 5 shows a message sequence chart, a message flow-chart or a message flow diagram.

15

20 The block 500 in Fig. 5 shows an initial procedure at the HNB 300 power up or upon an update procedure 500, when parameters within HNB 300 may have been amended.

In step S500 the HNB 300 scans for neighbour cells. In other words, the HNB 300 determines neighbours of HNB 300. Thus, HNB 300 may generate a Neighbour Cell List.

25

In step S501 the HNB 300 connects to the GERAN BSS 200 or the macro BS 200 and automatically triggered or manually triggered starts transferring home cell parameters such as CSG indicator bit, CSG ID, Phy ID, GCI, TAI, LAI and HNB HW ID, location information to the GERAN BSS 200. The information provided in step S501 corresponds to sending or providing of access parameter, i.e. physical access parameter and access control parameter, by a second Base Station 300 to a first Base Station 200.

30

35

The Base Station 200 or macro Base Station 200 uses the information provided by the second cell or by the second Base Station 300 or by the HNB 300 for updating a Home Cell Table (not shown in Fig.5). The Home Cell Table or CSG Table may be  
5 a list, comprising provided access parameters of available second Base Stations 300. If the Home Cell Table comprises at least one entry corresponding to the HNB 300, the first Base Station 200 knows that a HNB 300 may be available having the parameters registered in the CSG Table. Thus, terminals 100  
10 can be connected by the macro Base Station 200 to a corresponding HNB or CSG cell 300. Therefore, the Home Cell Table shows the HNBs 300 controlling second cells 300 and what kind of parameters the second cells may have.

15 The macro cell deployments could be of the same RAT of the HNBs 200 or of different RAT (Radio Access Technology). One possible scenario may be that a 3G (UMTS) HNB 300 or a LTE HNB 300 may be deployed in an area covered by a GERAN macro cell 200. An example for using a macro Base Station 200 and a  
20 HNB 300 may be to provide high data rates, for example in an indoor area such as in private home, in areas, which area may only be covered by GERAN macro cells. In other words, using the inventive concept, may allow in parallel to a GERAN macro overlay network comprising at least one macro cell 200, to  
25 increase network capacity by providing in parallel to the overlay network a 3G HNB 300 and/or LTE HNB 300 controlling corresponding cells. The macro cell 300 and the 3G HNB 300 or LTE HNB 300 may overlap.

30

A 3G HNB 300 and/or an LTE HNB 300 may need to be capable of scanning the surrounding environment of the HNB 200, in order to detect neighbour cells. Detected neighbour cells may be included in a Neighbour Cell List (NCL), which list may be  
35 administrated by the HNB 200. The NCL, once available within HNB 200, can be broadcasted from the home cell 300 to other networks, in order to support mobility from a home cell to another cell, i.e. outbound mobility. A HNB 300 may be able

to scan a GERAN operational frequency in order to detect neighbour GERAN cells.

The method for inbound mobility is described in block 501 in Fig. 5. As can be seen, since the blocks 500 and 501 are separated, that the process of powering on and updating an HNB 300, in particular a first Base Station 200 are running independently.

10 In step S500, as soon as the HNB 300 may be powered up, the HNB 300 may scan the surrounding radio environment and may detect neighbour cells of different RATs, including a macro GERAN cell 200.

15 A macro cell can become any non-CSG cell, i.e. any cell whose system information indicated that it was not a CSG cell. This may be automatically any cell, which is not adapted for becoming a CSG cell, e.g. a GERAN cell. Once one or more GERAN macro cells 200 have been found, the HNB 300 connects  
20 to the found GERAN macro cell 200. The HNB 300 for example connects to the GERAN macro cell 200 via fixed backhaul, i.e. a fixed wire bound backbone connection, or via radio link. By connecting to the GERAN macro cell 200, the macro cell now knows that a home cell HNB 300 is available. The HNB 300  
25 makes an upload of information relating to the home cell or CSG cell such as physical parameters and CSG ID.

Depending on whether the HNB 300 is UTRAN enabled or the HNB 300 is E-UTRAN enabled, the information upload from the HNB  
30 300 to the macro Base Station 200 could be a subset of possible access parameter.

In this text general the term Base Station may mean a sub-system which could comprise multiple systems, e.g. Base  
35 Transceiver Station (BTS) and/or Base Station Controller (BSC).

A home cell may be a Closed Subscriber Group cell.

Access parameter may be information how the HNB 300 may be accessed, in particular how the HNB 300 can be reached, for example by defining an address or a physical ID and who may  
5 be allowed to access the home cell 200.

Access parameter characterizing a HNB 300 may be a CSG information bit, wherein a value 0 for the CSG indicator bit mean disabled for CSG and a value of 1 would mean enabled for  
10 CSG. Thus, the CSG indicator bit may show whether the HNB 200 may provide a closed subscriber group identification. Furthermore, the access parameter provided by the HNB 300 comprise CSG ID, Global Cell ID (GCI), TAI, Location Area Identity (LAI), physical ID (e.g .scrambling code for an  
15 UTRAN HNB 300) or physical layer cell identity for an E-UTRAN Evolved HNB (EHNB). These access parameters are used by the cell supported by the HNB 200, furthermore the access parameter comprises the physical ID used by the cell supported by the HNB for example for scrambling code for an  
20 UTRAN HNB 300 or a physical layer cell identity for E-UTRAN EHNE. Furthermore, the access parameter comprises a HNB hardware ID (HNB HW ID).

The information uploaded to the GERAN BSS 200 may be a sub-  
25 set of the access parameter.

Whenever the home cell 300 parameters, which have been uploaded to the GERAN BSS (Base Station System) 200 or to the Base Station 200 change, the HNB 300 should connect to the  
30 GERAN BSS 200 and update the values of such access parameters of the access network node. Such an update may be required, when the CSG may suddenly be switched off and when the CSG indicator bit may be changed from 1 to 0.

35 In step S502 the GERAN BSS 300 stores the information received from the HNB 300 to a table, for example to a HNB cell table 600, home cell table 600 or a CSG Table 600. In the CSG table 600 or the CSG list, substantially all the home

cells 300 or second cells 300, which are operating in the macro GERAN cell, are listed together with their identification details, i.e. with their access parameter.

- 5 Thus, a macro cell 200 may be characterised by overlapping at least a part of a home cell 300.

An example a CSG Table 600 is shown in Fig. 6. Dependent on whether the home cell 300 which provides the access  
10 parameters belongs to UTRAN or E-UTRAN, different access parameter are available.

For example, a UTRAN home cell 300 may not be provided with a CSG ID. This is shown in Fig. 6 by an 'N/A' (not applicable)  
15 value for the CSG ID in line 2. The information stored in line 2 belongs to a predefined HNB 300, which is an UTRAN home cell 300. In other words, the CSG Table 600 comprise all the home cells, which the macro cell administrates. A UTRAN home cell 300 is also not be part of a tracking area, which  
20 may be used in LTE. But, a UTRAN home cell 300 may be part of a location area hence such UTRAN cells may be provided with a LAI rather than a TAI.

An E-UTRAN home cell 300 may have a CSG ID and may not have a  
25 LAI. The E-UTRAN home cell 300 may be associated with a TAI.

A TAI could be the same for more than one E-UTRAN home cell 300, as shown in Fig. 6. An UTRAN home cell 300 as well as an E-UTRAN home cell 300 will be assigned a physical ID from a  
30 limited pool of codes. This means, that more than one home cell might operate on the same Physical ID. Working or using the same Physical ID may have to be avoided as far as possible.

35 In the CSG cell table 600 each line 601 correspond to access parameter set of available home cells 300 or CSG cells 300, which CSG cells 300 are associated with the macro cell 200 comprising the CSG table 600. In the first column 602 of the

CSG table 600 a number reflecting the number of the entry is provided.

5 In the next column 603 the CSG ID of a home cell associated with the macro cell may be provided. As shown in line 2 of column 603, a CSG ID of N/A indicates an UTRAN home cell 300.

10 Column 604 comprises a PHY ID, column 605 comprises a GCI of a corresponding cell and column 606 comprises a TAI value, wherein an UTRAN home cell 300 has a TAI value of N/A.

15 The column 607 comprises LAI parameters, wherein a value of N/A in the LAI column 607 may mean that it belongs to an E-UTRAN home cell 300.

20 Column 608 comprises a CSG indicator bit, which can show whether the corresponding home cell 300 is active or not, in Fig. 6, column 608 every entry has a CSG indicator bit set to 1, which means that all four home cells 300 are active.

25 In column 609 a HNB HW value is provided.

Not shown in the table is centre frequency which is applicable for all cells, scrambling code , which is applicable for UTRAN cells. The physical cell Id applies only to E-UTRAN/LTE cells.

30 Centre frequency, scrambling code and physical cell ID are the access parameters, all the other parameter e.g. CSG ID 603, GCI 605, TAI 608 LAI 607, CSG Id. Bit 608 or CSG Indicator Bit 608 and HNB HW ID 609 could be access control parameters.

35 Coming back to Fig. 5, the UE 100 in Fig. 5 is shown in the GERAN connected mode S503.

In step S504 the UE 100 communicates over a data transport channel with the GERAN macro cell 200, which overlays the

home cell 300. Overlaying may mean that a footprint of the macro cell may comprise at least a part of a footprint of a home cell.

5 The UE 100 is capable of exchanging control messages on a dedicated control channel. The dedicated control channel may be an inband control channel, for example a Packet Associated Control Channel (PACCH), a Slow Associated Control Channel (SACCH) and a Fast Associated Control Channel (FACCH). The UE  
10 may use such a control channel for sending a message to the GERAN BSS 200 or to the first Base Station 200, where the UE specifies details about the home cells, which home cells 300 the UE can access. Thus, these control channels may be used for communicating or sending details about home cells 300,  
15 which home cells 300 the UE 100 can access. The details about the home cells 300 for example also include allowed tracking areas for CSG operation.

The terminal specific restriction information or the  
20 parameters sent by the UE might be CSG ID, GCI, TAI, LAI, HNB HW ID. These parameter may describe the restriction for the individual terminal 100.

In step S505, once the GERAN BSS 200 receives the home cell  
25 information request from the UE 100, the GERAN BSS 200 will look up the CSG Table 600 stored in the GERAN BS 200 in order to check if the cells specified by the UE are present and/or available in the GERAN macro cell coverage. The GERAN BSS  
30 200 may also check whether cells which the UE may not know about but which could be accessible to the UE (based on the terminal specific restriction information or other parameters sent by the UE) are present and/or available in GERAN macro cell coverage.

35 If any of the cells specified by the UE 100 or which may be accessible to the UE is present in the CSG Table 600, the GERAN BSS will forward access parameters for such cells such as the CSG indicator bit to the UE 100. The CSG indicator bit

highlights whether the home cell 300 is active or not.  
Providing the UE with information that a cell is not active  
may prevent scanning an inactive cell and wasting power by  
doing work which may never can be successful.

5

Furthermore, if any of the cells specified by the UE is  
present, the Phy ID (Physical Identifier) relative to the  
home cells 300 specified by the UE 100 in the request message  
to the UE may be forwarded. Furthermore, as an option or an  
10 alternative to the Physical ID, the centre frequency of a  
home cell 300 may be provided to the UE 200.

If the home cell list or home cell table in the GERAN BSS 200  
is relatively small in size, for example smaller than 22  
15 octets, and if any of the home cells 300 specified by the UE  
100 is contained in the list, in another exemplary embodiment  
of the present invention could be that the GERAN BSS 200  
replies to the UE 100 with the whole home cell list. This may  
mean, that when having a small home cell table, no filtering  
20 or parsing may be performed by the GERAN BSS 200. However,  
the terminal 100 may applies such filtering.

Providing the whole home cell table may save the GERAN BSS  
200 from parsing the CSG list or CSG table and from filtering  
25 out the information as requested.

Once the UE 100 is provided with the CSG indicator bit and  
the PHY ID, as shown in step S506 of Fig. 5, the CSG  
indicator bit and the PHY ID are taken from accessible home  
30 cells 300 by the UE 100. The UE 100 can search for such cells  
300 at physical layer by scanning the PHY IDs of the home  
cells 300 entered or provided by the GERAN BSS 300. In other  
words, the terminal receives access parameters, e.g. CSG  
indicator bit and the PHY ID, of an available and accessible  
35 second cell 300 which meet the terminal specific restriction  
information, which the UE 100 has sent to the GERAN BSS 200  
in step S504.

For some reasons the physical ID of home cells 300 may not be available if not provided by the GERAN BSS 200.

One reason for physical ID being unavailable could be since  
5 the home cells 300 or second cells 300 are not listed in the NCL of the macro cell due to their high number. I.e. since the neighbour cell list (NCL) including all home cell information could take a considerable time to transmit and consume a lot of bandwidth.

10 Another reason for physical ID being unavailable may be because the intended "default" behaviour is that terminals do not measure or try to access home cells.

15 Yet another reason for physical ID being unavailable may be because legacy devices which have no subscription may be prevented from trying to access these cells since the NCL is broadcast to all mobiles in a cell.

20 Providing the CSG indicator bit and CSG ID may allow preventing to decode the SIBs in the BCCH of home cells 300 in order to understand or explore whether a home cell 300 is accessible. Since no sophisticated decoding must be employed incurring in service interruptions may be prevented.

25 Furthermore, it could be that only physical parameters or some part of the physical parameters e.g. the centre frequency of a cell are provided in the first cell, but no subscription information, e.g. CSG ID, relating to those  
30 cells is provided in the neighbour cell list. Therefore even though the mobile knows of the existence of a home cell, it does not know without time-consuming decoding of the SIB whether it can access that cell.

35 Fig. 7 shows the message flow diagram of Fig. 5, wherein the method on which the message flow diagram is based is more general than in Fig. 5.

Fig. 7 shows a message flow diagram for a method for home cell 300' information distribution within overlapping macro cells 200' for any type, i.e. either of same RAT or different RAT.

5

Steps S700, S701 and S702 correspond to steps S500, S501 and S502, respectively. Compared with Fig. 5, in Fig. 7 a 3G/LTE HNB 300' performs a general scan and detection of multi RAT neighbour cells. Furthermore, the general macro BS 200' is

10

shown.

In step S704 the UE 100, which in step S703 is either in IDLE or in ACTIVE mode, connects to the Macro BS 200' and requests information about the home cells 300' which the UE 100 can

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access. As in step S504, in step S704 the request message includes a subset of the parameters CSG ID, GCI, TAI, LAI, HNB HW ID.

In step S705 the macro BS 200' replies to the UE 100 by providing Physical ID and possibly the CSG Indicator bit for the home cells 300' specified by the UE 100. In another exemplary embodiment the centre frequency may also be provided if the centre frequency is not included in the NCL.

20

providing Physical ID and possibly the CSG Indicator bit for the home cells 300' specified by the UE 100. In another exemplary embodiment the centre frequency may also be provided if the centre frequency is not included in the NCL.

If the Home Cell List 600 in the Macro BS 200' is relatively small in size and if any of the home cells specified by the UE 100 is contained in the list 600, an other exemplary embodiment of the present invention may be that the Macro BS 200' replies to the UE 100 with the whole CSG list 600.

25

If the Home Cell List 600 in the Macro BS 200' is relatively small in size and if any of the home cells specified by the UE 100 is contained in the list 600, an other exemplary embodiment of the present invention may be that the Macro BS 200' replies to the UE 100 with the whole CSG list 600.

30

This may save the Macro BS 200' from parsing the list and filtering out the information requested.

Once the UE 100 knows the CSG ID and Physical ID of its accessible home cells 300', as shown in step S706, the UE 100 can search for the home cells 300' by only looking at their Physical IDs and avoiding decoding their BCCH. This may save

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accessible home cells 300', as shown in step S706, the UE 100 can search for the home cells 300' by only looking at their Physical IDs and avoiding decoding their BCCH. This may save

UE battery power and reduce the amount of eventual signalling messages generated by erroneous home cell access attempts.

By searching for the physical IDs provided by the Macro BS 200' only in the location areas where the UE 100 previously detected the presence of accessible home cells 300' the risk of encountering a non accessible home cell with the same Physical ID of accessible cells can be reduced.

10 The UE 100 in GERAN Active mode may be able to detect accessible home cells 300' and therefore to handover to the accessible home cells 300' by preventing unnecessary service interruptions. Thus, even a GERAN macro cell 200, 200' to home cell 300, 300' mobility or handover may be possible  
15 since a high QoS degradation caused by adoption of current cell reselection techniques can be prevented.

In other words, a UE 100 receives information about accessible home cells 300, 300' and/or accessible CSG cells  
20 while the UE 100 is connected to or located in an overlapping Macro cell 300, 300'.

Thus, the proposed methods, base stations and/or terminals can be used in networks where home cells 300, 300' are  
25 deployed.

Thus, easier detection of home cells 300, 300' with minimized UE 100 battery consumption and QoS degradation may be possible.

30

Fig. 8 shows a network 800 comprising the macro cell 803, the active CSG cells 804 and the passive CSG cell 805. The macro cell overlap the active CSG cell 805 completely and the passive CSG cell 804 partially.

35

The active cell 805 is active, since the active cell is used by terminal 100. Terminal 100 is allowed to use CSG cell 805

since terminal 100 is member of the CSG associated with CSG cell 805.

5 The macro cell 803 is controlled by the macro Base Station 200, the passive CSG cell 804 is controlled by the passive Base Station 300a and the active cell 805 is controlled by the active Base Station 300b.

10 The macro Base Station 200 sends an indicator in order to show, that macro Base Station has information about CSG cells 804, 805.

15 The macro Base Station 200, the active Base Station 300b and the passive Base Station 300a are connected to different network nodes of the network nodes 802. The network nodes 802 in combination with the network 801 form the backbone for the cellular network 800. The nodes 802 linking the base stations 200, 300a, 300b may comprise further controlling devices such as RNC (Remote Network Controller), BSC (Base Station  
20 Controller) and / or MSC (Mobile Switching Center).

In Fig. 9 a terminal 100 is shown which receives in step S901 an indicator from the macro Base Station 200, the Base Station controller 200 or the Radio Access Network 200, e.g.  
25 the indicator is a periodical broadcast signal or a periodically sent flag. E.g. the indicator can also be sent in a message dedicated to a terminal.

If the terminal detects the indicator, in Step S902 a message  
30 is sent to the macro Base Station 200 comprising terminal-specific restriction information or terminal access information. The macro Base Station 200 compares in step S903 this terminal-specific restriction information with stored information on other cells such as a CSG Table.

35 As a result of comparing in step S904 the macro Base Station 200 sends at least a subset of information on base stations which can and/or which are allowed to be accessed by the

terminal to the terminal 100, i.e. access parameters. The information about base stations sent in step S904 may comprise information on base stations with limited access like CSG cells or CSG base stations. This information about accessible base station may be additional information to information which may be sent in a NCL. Thus, an extended or limited NCL may be provided, the extended NCL having additional information about cells, which may be allowed to be accessed by terminal 100. Since this may be a subset of all neighbors, the extended NCL may have less entries than a standard NCL.

In step S905 the terminal 100 starts scanning base stations according to the received information.

Fig. 10 shows substantially the steps shown in Fig. 9. In addition to Fig. 9, in Fig. 10 the Server 10000 is added. Server 10000 may be a central server comprising a data base in a backbone network. Server 10000 is connected to macro Base Station 200.

The server 10000 stores the terminal-specific restriction information. Thus, in step S902' it is not the terminal which sends the terminal-specific restriction information. In step S902' the terminal 100 sends a message to the macro Base Station 200, informing the Base Station 200 that the Base Station 200 can find terminal-specific restriction information of terminal 100 on the server 10000. For example the terminal 100 sends a network address of the server 10000.

On receiving the information that terminal-specific restriction information are stored on server 10000, in step S903' the macro Base Station sends a request message to server 10000, requesting terminal-specific restriction information for terminal 10000.

In step S903'' the server 10000 provides corresponding terminal-specific restriction information associated with

terminal 100. This terminal-specific restriction information or terminal access information can be used in step S903 for providing information on base stations which can be accessed by the terminal 100, in particular providing access  
5 parameter.

Thus, terminal 100 receives the information needed for scanning the corresponding base stations.

10 In other words, this may mean that the HNB 300, 300' on power-up and periodically afterwards, detects the broadcast control channel (BCCH) of an overlaying macro cell 200, 200' or of a plurality of overlaying macro cells 200, 200' the HNB 300, 300' is within range of.

15 Furthermore, the HNB 300, 300' communicates information about the HNB 300, 300' to the nodes 300, 300' in the network which are associated with these macro cells 200, 200' , e.g. the macro cell controllers 201, or some other node, e.g. in a  
20 case where the base station and the node containing the table are not the same entity or if there exist one node storing the table for multiple base stations.

The HNB 300, 300' may be connected to a HNB Gateway or a HNB  
25 server. This Gateway may be a OAM (Operation and Maintenance) proxy and the Gateway may connect to a domain server, which serves not only the Femto BSs 300, 300' but also GSM BSs, UMTS BSs, LTE BSs etc. Therefore, the Gateway is able to exchange information to/from other BSs via the  
30 domain server. The domain server is a OAM node and therefore exchange of information via such node is not regulated by the standard.

Furthermore, a UE 100 in contact with a macro cell 200, 200'  
35 indicates to the controller 201 of the macro cell 200, 200' that it wishes to receive a list of HNBs 300, 300' which the UE 100 may access or which the UE as far as the UE 100 knows

access. This indication may be sent in an other than the GSM connected mode.

The UE 100 may provide parameters or terminal-specific restriction information to indicate any subset of HNBs 300, 300' which the UE 100 knows that the UE 100 may access, or any subset of HNBs 300, 300' which the UE 100 knows that the UE may not access, e.g. in the form of a blacklist or a whitelist.

The UE 100 may also provide the location information of the UE 100. In an example, the UE 100 tells a controller 201 which HNBs 300, 300' the UE 100 is allowed to access and/or the UE 100 tells a controller 201 the UE's own location. E.g. if inbound channelling is to be used.

In order to accelerate the finding of accessible HNBs 300, 300', the HNB 300, 300' are stored in a central server or in a HLR (Home Location Register). This may prevent transmitting parameter from the UE.

Thus, a UE 100 in RRC\_connected mode can be informed that there are accessible Femto Cells 300, 300' in range of the UE 100 and to let the UE 100 know their Phy ID. The UE 100 may send a request to the macro BS 200, 200' with the UE's location and a list of accessible Femto Cells 300, 300' may be to minimize the signalling effort. E.g., if the UE 100 may not notify the macro BS 200, 200' about the UE's location the macro BS 200, 200' would send to the UE all the possible Femto Cells 300, 300' accessible in the macro cell 200, 200' or in the administration area of the macro cell 200, 200' . This might result in a long list of Femto Cells 300, 300 or home cells 300, 300'.

Storing of HNB information in a central server may be realized in each HNB informing the macro BS 200, 200' of the existence of the HNB 300, 300' at power up of the HNB 300, 300'. Therefore, the macro BS 200, 200' may contain

information on all Femtos or femto cells 300, 300' included in the macro cell 200, 200'.

5 The controller 201 of the macro cell 200, 200' provides a list of identifiers of HNB cells 300, 300' to the UE 100. Optionally the controller may also provide other parameters associated with the cells 300, 300' to the UE 100. For example, unless the list 600 is very short, the list 600 may be filtered based on the parameters or terminal-specific  
10 restriction information provided to the macro cell 200, 200' by the UE 100.

The macro cell controller 201 may not have the list 600 stored, in which case it relays the request and response  
15 to/from the node which stores the list.

The provided identifiers can be on physical level to enable a terminal in GERAN connected mode, to detect and measure the cell without degradation of the ongoing connection. GERAN  
20 connected mode may be the same as dedicated mode, packet transfer mode, dual transfer mode or RRC\_connected mode. Furthermore, the list 600 may be filtered based on the location of the UE 100. In another example, the NCL is provided in the GERAN active mode. Furthermore, the macro  
25 cell 200, 200' may provide information to the UE 100 based on information formerly received by the UE or based on history information. Using of history information may enabled by storing history information in the UE 100.

30 The controller device 201 of a macro Base Station 200, 200' may provide a list of HNB cells which list the UE 100 may use to perform a neighbour cell measurement based on the provided list. The controller device 201 can be a server 201 in the network, a radio network controller 201 or a macro cell.

35

The UE 100 may only perform physical layer measurements on femto cells 300, 300', i.e. the UE 100 may measure only on the phy ID of the provided femto cells 300, 300'.

If the UE 100 receives a list indicating one or more HNBs 300, 300' which the UE 100 believes to be accessible, the UE 100 performs appropriate scanning to detect and optionally  
5 connect to the HNB 300, 300'.

Furthermore, the UE 100 may indicate the presence of accessible HNBs via measurement reports to the macro cell 200, 200' to which macro cell the UE 100 is currently  
10 connected. Based on these measurements the macro cell controller 201 may initiate a network-controlled handover, or a network-assisted cell change of the UE towards the HNB.

The macro cells 200, 200' may be of the same or different RAT  
15 as the HNB cell 300, 300'.

Parameters relating to the HNB 300, 300' which are conveyed to the node 300, 300' associated with the macro cell 200, 200' may include RAT or RATs supported, centre frequency,  
20 CSG indicator bit indicating whether CSG rules apply to the corresponding cell, CSG ID i.e. the identity of the CSG, Global Cell ID, TAI, LAI/RAI, Physical ID e.g. scrambling code for a UTRAN HNB or physical layer cell identity for E-UTRAN eHNB (evolved HNB), HNB Hardware ID and/or Location  
25 e.g. obtained by GPS receiver.

The connection between the HNB 300, 300' and the node may be over the air interface, or via a backhaul connection e.g. through the core network. One example of the backhaul  
30 connection might be using the RAN (Radio Access Network) Information Management protocol, which operates over a core network. The core network connects base stations with core network nodes e.g. SGSNs (Service GPRS Support Node) / MSCs (Mobile Switching Center) / GGSNs (Gateway GPRS Support Node etc.) or by some other means e.g. an internet protocol-based  
35 network.

The parameters associated with a macro cell are periodically determined in order to detect new and/or disabled macro cells and whenever any of the above parameters associated with the HNB 300, 300' change.

5

Thus, the HNB 300, 300' may be powered on and off many times and the HNB 300, 300' may change its radio parameters, e.g. Phy ID, CSG ID, CSG indicator bit, etc. Therefore, whenever the HNB 300, 300' powers up and there is a change of radio  
10 parameters the HNB 300, 300' may inform the macro BS 200, 200' of this change.

May not all parameters need to be transmitted to the macro cell 200, 200' . For example, it might only be sufficient to  
15 report a subset consisting of Phy ID, Centre frequency and CSG ID.

The received parameters are stored by the node 200, 200'. This may be e.g. using a common database for all cells, or by  
20 using one database/table for each RAT (e.g. UTRAN/ LTE) of the HNB 300, 300'.

The parameters can either be stored on the macro BS 200, 200' or they can be stored on a central server.

25

In a GERAN macro cell 200, the UE 100 may communicate with the macro controller 201 using a dedicated control channel. Such in band control channel could be the Packet Associated Control Channel (PACCH), or the Slow Associated Control  
30 Channel (SACCH) and a Fast Associated Control Channel (FACCH).

Parameters sent by the UE 100 may include RAT capabilities i.e. which RAT(s) it is able to access, list of frequency  
35 bands on which the UE 100 can operate, list of CSG IDs (those CSG IDs which are in the CSG 'whitelist' for the UE 100, i.e. the CSG ID the UE 100 is authorized to connect to), a list of not-allowed TAIs, a list of not-allowed LAIs, a location

(obtained e.g. by GPS), a speed and a time before next request.

For some parameters, a 'NULL' option may be signalled e.g. in  
5 the case of LAIs and TAIs, 'NULL' may indicate that the UE  
100 has no not-allowed LAIs or TAIs.

The node 200, 200' containing the list of HNB cells 300, 300'  
and the macro controller 201 can be the same node. In the  
10 case of a GERAN macro cell 200, 200' , this node is the GERAN  
BSS 200, 200'.

The BSS shall, at a minimum, send only details of HNBs 300,  
300' which use the RAT or RATs that the UE 100 is capable of.  
15

A neighbour cell list may only include the HNBs 300, 300'  
accessible by the UE 100 in that location or close by to the  
actual location of the UE 100. If a customised NCL reporting  
is selected the NCL may comprise Phy IDs of the accessible  
20 Femtos in that location of the UE 100.

The BSS 200, 200' may further filter the list 600 to send  
only details of those cells 300, 300' which the UE 100 is  
likely to be able to access based on the parameters provided  
25 by the UE 100. I.e. those home cells 300, 300' whose CSG ID  
is in the UE's CSG whitelist and/or whose TAI/LAI are not in  
the list of not-allowed TAI/LAI, etc.

The list 600 provided by the BSS 200, 200' is filtered on  
30 the basis of the information provided by the UE 100, i.e.  
based on the UE location and/or on the CSGs/TAI/LAI  
accessible by the UE. This may be done in order to avoid  
that the BSS sends a huge list of all possible Femto cells  
300, 300' in range to the UE 100.

35 If the entire list fits within one message block, then the  
BSS may not apply any filtering.

The UE 100 knows which Femto cells 300, 300' the UE 100 can access e.g. via the CSG whitelist. Therefore, in order to save processing power at the BSS 200, 200', if the list 600 of available femto cells 300, 300' or HNBs 300, 300' is small  
5 i.e. it fits within the 22 octets available in a GERAN control message, the BSS 200, 200' will send the entire list to the UE and the UE will derive the Phy IDs to measure for the CSGs it can access. This filtering within the UE 100 may also prevent the UE 100 to perform measurements on all the  
10 entries on the list.

If the location of the UE 100 is known and the location of a HNB cell 300, 300' is known, the BSS 200, 200' may omit that cell if it is likely to be out of range of the UE 100. In an  
15 other example, if based on speed and time before next request, it is likely to remain outside of range of the UE until the next request is received the BSS 200, 200' may also omit that cell. Such a selection, estimation and evaluation may be used if cells of a given RAT are likely to  
20 be outside the range of the UE. Then the list can be empty, to avoid the need for the UE to initiate searching for that RAT.

However, it is possible that two HNB cells 300, 300' have  
25 identical physical Ids, e.g. if the HNB cells 300, 300' are not distinguishable without reading the system information. Such cells may have differing other parameters (e.g. TAI / CSG ID etc.), so that a UE 100 may be able to access one but not the other.

30

If all parameters are equal, and the location of the cells is not known, the BSS may consider these as a single entry in the table 600 and therefore in lists sent to Ues 100.

35 If the parameters are different, and the locations are known, the BSS may send the parameters for one or other or both depending on their location relative to the UE.

More than one home cell 300, 300' could use the same Physical ID. Therefore, a UE 100 provided with the Physical ID of its accessible home cells 300, 300' could still be subject to the risk of attempting to camp on a home cell the UE is not  
5 allowed to access.

Thus, in an other exemplary embodiment of the present invention a UE centric way of reducing the risk of attempting to camp on a home cell the UE is not allowed to  
10 access is to scan for Physical IDs provided by the macro BS 200, 200' only when matching home cells 300, 300' location information are detected. In other words, the UE 100 may start searching for the CSGs identified by the Physical IDs provided by the Macro BS 200, 200' only when the UE 100  
15 records locations corresponding to the location in which any of the accessible CSGs was detected last. Such location information recorded by the UE during previous home cell access may be at least one location information selected from the group of location information consisting of a Macro cell  
20 context within which the home cell 300, 300' has last been accessed, a GPS location recorded at last home cell 300, 300' access, a TA recorded at last home cell 300, 300' access and a LA recorded at last home cell 300, 300' access.

25 Any location information recorded at last home cell 300, 300' access that allows the UE 100 to gather knowledge of home cell 300, 300' proximity may be used.

The UE 100 in RRC\_connected cannot perform cell measurements,  
30 i.e. cannot decode SIBs. Therefore the macro BSS 200, 200' provides a list of femto cells 300, 300' that are available in the macro cell 200, 200' and the UE checks which Phy ID to scan for according to its location. This may allow providing the UE location to the BSS 200, 200' and may allow the BSS  
35 200, 200' to provide an already filtered list of Femto Cells 300, 300'.

The BSS 200, 200' shall indicate to the UE 100 the level of filtering that has been applied to generate the list. For the parameters that could be provided by the UE 100, the BSS 300, 300' shall indicate whether the BSS 300, 300' applied  
5 filtering based on that parameter.

An indication also may be provided by the BSS 300, 300' if the BSS 300, 300' is including the whole list, e.g. because it is small, and that no filtering was applied.

10

For parameters where either no parameters were provided by the UE 100 or no indication that the parameter was 'NULL' or where filtering was not applied, the BSS should provide that parameter associated with each HNB cell 300, 300'. Where a  
15 parameter or a NULL indication was supplied by the UE 100 and the BSS 200, 200' filtered the list according to the parameter, the BSS 200, 200' may reduce the size of the list by omitting that parameter for each cell.

20 A macro cell controller 201 (GERAN BSS 200, 200' /UTRAN RNC 200, 200' may indicate that at least one CSG cell 300, 300' within coverage area of the macro cell 200, 200' exist, that no CSG cells 300, 300' within the coverage area of the macro cell 200, 200' exist, or that the macro cell controller 201  
25 has no knowledge of CSG cells 300, 300'.

In another exemplary embodiment of the present invention, a macro cell controller 201 stores a list of CSG IDs associated with e.g. <frequency, PCI (Physical Cell Identifier)>  
30 identities of CSG cells 300, 300'. In other words, the physical parameters needed for an LTE cell, including a home LTE cell are frequency and physical layer cell ID, e.g. PCID, PLCID, PCI etc . The existence of such a list is also signalled in system information, as carried in System  
35 Information messages or SIBs.

If a MS 100 or UE 100 is CSG-capable, i.e. that the UE 100 has a subscription to at least one CSGs, then if the BSS 200,

200' indicates that at least one CSGs 300, 300' exists within the coverage area of a macro cell 200, 200', the MS 100 can prompt the user to trigger a manual search.

5 In another exemplary embodiment of the present invention, if the BSS 200,200' indicates that at least one CSG exists within the coverage area and that the BSS 200, 200' has stored a list of CSG IDs, the MS 100 can request that information from the BSS.

10

If the MS 100 requests information from the BSS 200, 200', then the MS 100 may provide the MS's 100 CSG whitelist, to allow the BSS 200, 200' to respond only with information about CSG cells 300, 300' which the MS 100 is able to access.

15

Maintenance of the BSS list 600 could be via O&M and/or by automatic updating from MS's measurement reports. For example, a mobile 100 could be requested to report to the BSS 200, 200' the results of a manual search, i.e. for each CSG  
20 cell found, its CSG ID, Frequency and PCI.

This may also apply to UTRAN CSGs for example, in the situation where a UTRAN CSG cell existed in an area where there was no other UTRAN coverage.

25

Making apparent from the PCI whether the cell is a CSG cell or not may avoid mobiles 100 which are not "CSG-capable", i.e. have no CSG subscription, measuring and attempting  
30 reselection to LTE CSG cells 300, 300'.

30

If no such distinction is possible then it may be necessary to blacklist CSG cells

35

For cases where the mobile 100 is already in a CSG cell 300, 300' on a dedicated frequency, the fact that this is a dedicated CSG frequency may be signalled in the CSG cells system information , so that mobiles in connected mode know that other cells on the same frequency are all CSG cells.

For CSG UMTS cells 300, 300', a difference to CSG cells using LTE apply. CSG UMTS cells 300, 300' may by default not be listed in neighbour cell lists.

5

It should be noted that the term "comprising" does not exclude other elements or steps and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined.

10

It should also be noted that reference signs in the claims shall not be construed as limiting the scope of the claims.

**Acronyms and Terminology**

|    |      |                          |
|----|------|--------------------------|
|    | BSS  | Base Station Subsystem   |
| 5  | CSG  | Closed Subscriber Group  |
|    | GCI  | Global Cell Identifier   |
|    | HNB  | Home Node B              |
|    | HeNB | Home eNode B             |
|    | LA   | Location Area            |
| 10 | LAI  | Location Area Identifier |
|    | MS   | Mobile Station           |
|    | NCL  | Neighbour Cell List      |
|    | QoS  | Quality of Service       |
|    | RAT  | Radio Access Technology  |
| 15 | TA   | Tracking Area            |
|    | TAI  | Tracking Area Identifier |
|    | UE   | User Equipment           |

## Patent claims

5

1. A Method for indicating to a terminal (100) the presence of an accessible cell, the method comprising:

providing terminal-specific restriction information for possible cell access to a first base station (200, 200')

10 

controlling a first cell;

receiving in the terminal (100) indication of the existence of an available second cell meeting the terminal-specific restriction information.

15 

2. Method of claim 1, further comprising:

receiving in the terminal (100) access parameter of an available second cell meeting the terminal-specific restriction information.

20 

3. Method of claim 2, further comprising:

scanning the received access parameter.

4. Method of one of claims 1 to 3, wherein the second cell is overlapped by the first cell.

25

5. Method of one of claims 1 to 4, wherein the second cell is controlled by a second base station (300, 300');

wherein the first base station (200, 200') is a macro Base Station (200, 200') controlling a macro cell;

30 

wherein the second cell is accessible to a subset of a set of users who are allowed to access the first cell.

6. Method of one of claims 1 to 5, wherein the first cell and the second cell adopt a different Radio Access

35 

Technology.

7. Method of one of claims 1 to 6, wherein a Radio Access Technology of the first cell (200, 200') and/or of the second

cell (300, 300') is at least one technology selected from the group consisting of GERAN, UMTS and LTE.

8. Method of one of claims 1 to 7, wherein the terminal  
5 specific restriction information comprises at least one restriction information selected from the group consisting of:

10 a Closed Subscriber Group Identifier,  
a Closed Subscriber Group whitelist,  
a dedicated Closed Subscriber Group frequency,  
a location of the terminal,  
a previously recorded location information,  
a speed of the terminal,  
a Radio Access Type capability of the terminal,  
15 a frequency band on which the terminal can operate,  
a prohibited Tracking Area Identifier,  
a previously recorded Tracking Area Identifier  
a prohibited Location Area Identifier,  
a previously recorded Location Area Identifier,  
20 a Global Call Identifier,  
a time before next request,  
a macro cell context,  
a Home NodeB Hardware Identifier, and  
a Global Positioning System location.

25 9. Method of one of claims 1 to 8, wherein the received access parameter is an access parameter, which allows the terminal (100) a fast and/or substantially impact-less scanning of a corresponding second cell.

30 10. Method of one of claims 1 to 9, wherein the received access parameter comprises at least one access parameter selected from the group consisting of:

35 a Physical Cell Identifier,  
a centre frequency,  
a Closed Subscriber Group Identifier,  
a Closed Subscriber Group indicator Bit  
a Tracking Area Identifier,

5       a Location Area Identifier,  
      a Routing Area Identifier, and  
      a Neighbour Cell List,  
      a base station identity code,  
      a scrambling code.

11. Method of one of claims 1 to 10, further comprising:  
      requesting the access parameter associated with the  
      second cell

10

12. Method of one of claims 1 to 11, further comprising:  
      using for providing the terminal-specific restriction  
      information at least one channel selected from the group of  
      channels consisting of:

15       a Packet Associated Control Channel,  
      a Slow Associated Control Channel, and  
      a Fast Associated Control Channel.

20 13. A Method for accessing a cell by a terminal (100)  
      comprising:  
      receiving in the terminal (100) information about the  
      presence of at least one cell;  
      displaying the information on the terminal (100);  
25       receiving a trigger for starting searching an accessible  
      cell.

14. A Method for providing an access parameter by a first  
30 Base Station (200, 200') to a terminal (100) connected to the  
      first Base Station (200, 200'), the method comprising:  
      storing in the first Base Station (200, 200') an access  
      parameter and/or an access control parameter for at least one  
      available second cell;  
35       wherein the first Base Station (200, 200') controls a  
      first cell; and  
      wherein a second Base Station (300, 300') controls the  
      second cell;

receiving in the first Base Station (200, 200')  
terminal-specific restriction information for possible cell  
access for the terminal (100);

selecting from the stored access parameter and/or from  
5 the stored access control parameter such an access parameter  
of available second cells, which second cells meet the  
terminal-specific restriction information.

15. Method of claim 14, further comprising:

10 making available at least one second cell by connecting  
the at least one second Base Station (300, 300') and/or by  
connecting a further terminal (100) to the first Base  
Station; and by

receiving in the first Base Station (200, 200') access  
15 parameter for the at least one available second cell from the  
at least one second Base Station (300, 300') and/or from the  
further terminal (100).

16. Method of claim 15, further comprising:

20 receiving in the first Base Station (200, 200') access  
restriction information.

17. Method of claim 14 or 16, wherein the access parameter  
for the at least one available second cell comprises at least  
25 one access parameter selected from the group of access  
parameter consisting of:

a Closed Subscriber Group Identifier,  
a Closed Subscriber Group indicator Bit,  
a dedicated Closed Subscriber Group frequency,  
30 a location of the second Base Station,  
a Radio Access Type,  
a frequency band on which the second Base Station can  
operate,  
a Tracking Area Identifier,  
35 a Location Area Identifier,  
a GCI,  
a Neighbour Cell List,  
a physical layer cell identity,

a scrambling code and  
a Home NodeB Hardware Identifier.

18. Method of one of claims 14 to 17, further comprising:

5 storing the access parameter and/or information used to  
determine whether access is possible for a given terminal to  
access the cell in a Closed Subscriber Group Table.

19. Method of one of claims 14 to 18, further comprising:

10 sending an indication that the first Base Station (200,  
200') has information about an available second cell and/or  
sending an indication that the first Base Station has  
detected at least one second cell in a predefined distance of  
the first Base Station.

15

20. Method of one of claims 14 to 19, further comprising:

receiving update information for the at least one access  
parameter.

20

21. Method of one of claims 14 to 20, further comprising:

selecting from the stored access parameter at least one  
physical access parameter selected from the group consisting  
of:

25 a Physical Cell Identifier,  
a centre frequency,  
a Closed Subscriber Group Identifier,  
a Closed Subscriber Group indicator Bit  
a Tracking Area Identifier,  
30 a Location Area Identifier,  
a Routing Area Identifier, and  
a Neighbour Cell List,  
a base station identity code,  
a scrambling code.

35

22. Method of one of claims 14 to 21, selecting further  
comprising:

filtering the stored access parameter such, in order to gather an access parameter of available second cells, which second cells meet the terminal-specific restriction information.

5

23. A Method for providing an access parameter to a first Base Station (200, 200') by a second Base Station (300, 300'), the method comprising:

10 connecting the second Base Station to the first Base Station (200, 200');

wherein the first Base Station (200, 200') controls a first cell; and

wherein the second Base Station (300, 300') controls a second cell;

15 providing the access parameter for the second cell to the first Base Station (200, 200') by the second Base Station (300, 300').

24. Method of claim 23, the access parameter comprising at least one access parameter for the second cell selected from the group of access parameter consisting of:

25 a Closed Subscriber Group Identifier,  
a Closed Subscriber Group indicator Bit,  
a dedicated Closed Subscriber Group frequency,  
a location of the second Base Station,  
a Radio Access Type,  
a frequency band on which the second Base Station can operate,

30 a Tracking Area Identifier,  
a Location Area Identifier,  
a GCI,  
a Neighbour Cell List, and  
a Home NodeB Hardware Identifier.

35 25. Method of one of claims 23 or 24, further comprising:

providing the access parameter upon at least one of power up the second Base Station (300, 300') and updating the second Base Station (300, 300').

26. Method of one of one of claims 23 to 25, further comprising:

5        sending information about the second cell to at least one other Base Station.

27. A Method in a Base Station for signalling the availability of information about an available other cell, comprising:

10        sending an indication whether the Base Station has information about an available other cell and/or  
         sending an indication whether the Base Station is capable to provide an access parameter and/or  
         sending an indication that the Base Station has detected  
15        at least one other cell in a predefined distance of the Base Station.

28. A Program element, which when being executed by a processor is adapted to carry out at least one method

20        selected from the group of methods consisting of  
         the method for selecting in a terminal a cell for the terminal of one of claims 1 to 12,  
         the method for accessing a second cell by a terminal of claim 13;  
25        the method for providing an access parameter by a first Base Station to a terminal of one of claims 14 to 22,  
         the method for providing an access parameter to a first Base Station of one of claims 23 to 26, and  
         the method in a Base Station for signalling the  
30        availability of information about an available other cell of claim 27.

29. A Terminal (100) for selecting a cell for the terminal (100), the terminal (100) comprising:

35        a terminal controller device(101);  
         a cell determining device (102);  
         wherein the terminal controller device (101) is adapted for

providing terminal-specific restriction information for possible cell access for the terminal (100);

wherein the cell determining device (102) is adapted for providing the terminal-specific restriction information to  
5 the first base station (200, 200');

and/or for

receiving in the terminal (100) indication of the existence of an available second cell meeting the terminal-specific restriction information.

10

30. A Terminal (100) for accessing a cell:

a controller device (101);

a displaying device;

wherein the displaying device is adapted for displaying  
15 the information on the terminal (100);

wherein the controller device (101) is adapted for

receiving in the terminal (100) information about the presence of at least one cell;

and/or for

20 receiving a trigger for starting searching an accessible cell.

.

31. A Base Station (200, 200') for providing an access  
25 parameter to a terminal (100), the Base Station comprising:

a controller device (201);

a storage device (203);

wherein the storage device (203) is adapted for storing in the Base Station an access parameter for at least one  
30 available cell;

wherein the controller device (201) is adapted for:

receiving in the Base Station (200, 200') terminal-specific restriction information for possible cell access for the terminal (100); and for

35 selecting from the stored access parameter such an access parameter of available cells, which cells meet the terminal-specific restriction information.

32. A Base Station (300, 300') for providing access parameter to a first Base Station (200, 200'), the Base Station comprising:

5       a controller device (301);  
      a cell controlling device (302);  
      a connecting device (303);  
      wherein the connecting device (303) is adapted to connect the Base Station (300, 300') to a first Base Station (200, 200');  
10       wherein the cell controlling device (302) is adapted for:  
          controlling a cell; and  
          wherein the controller device (301) is adapted for:  
          providing access parameter for the cell to the  
15       first Base Station (200, 200').

33. A signalling apparatus (400) for signalling the availability of information about an available other cell, the signalling apparatus comprising:

20       a Base Station (401);  
      a signalling device (402);  
      wherein the signalling device (402) is connected to the Base Station (401); and  
      wherein the signalling apparatus (400) is adapted for  
25       sending an indication whether the Base Station has information about an available other cell and/or for sending an indication whether the Base Station is capable to provide an access parameter and/or for  
      sending an indication that the Base Station (401) has  
30       detected at least one other cell in a predefined distance of the Base Station (401).

FIG 1

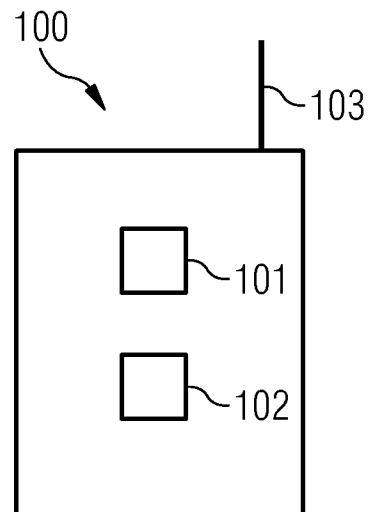


FIG 2

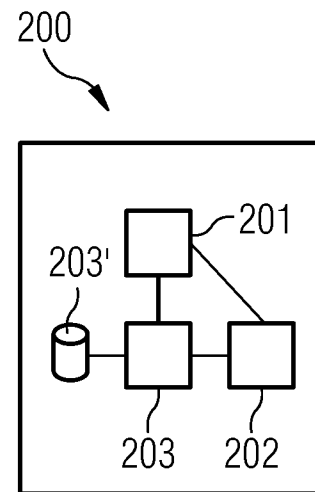


FIG 3

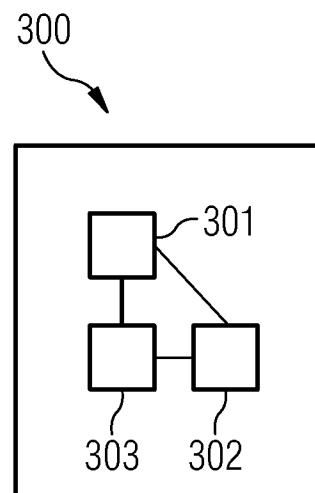
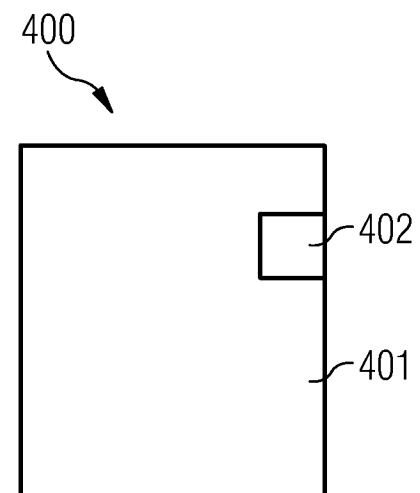
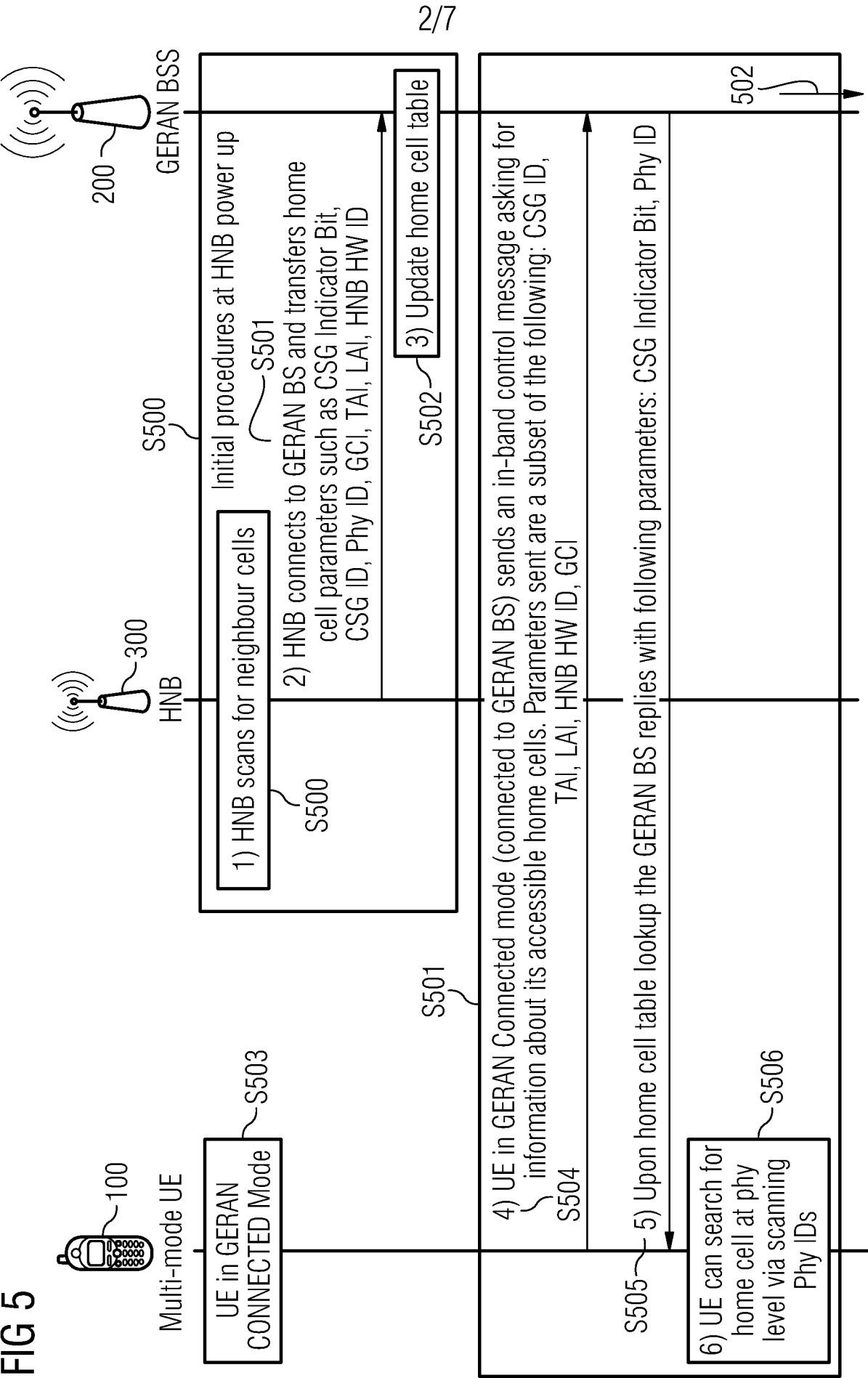


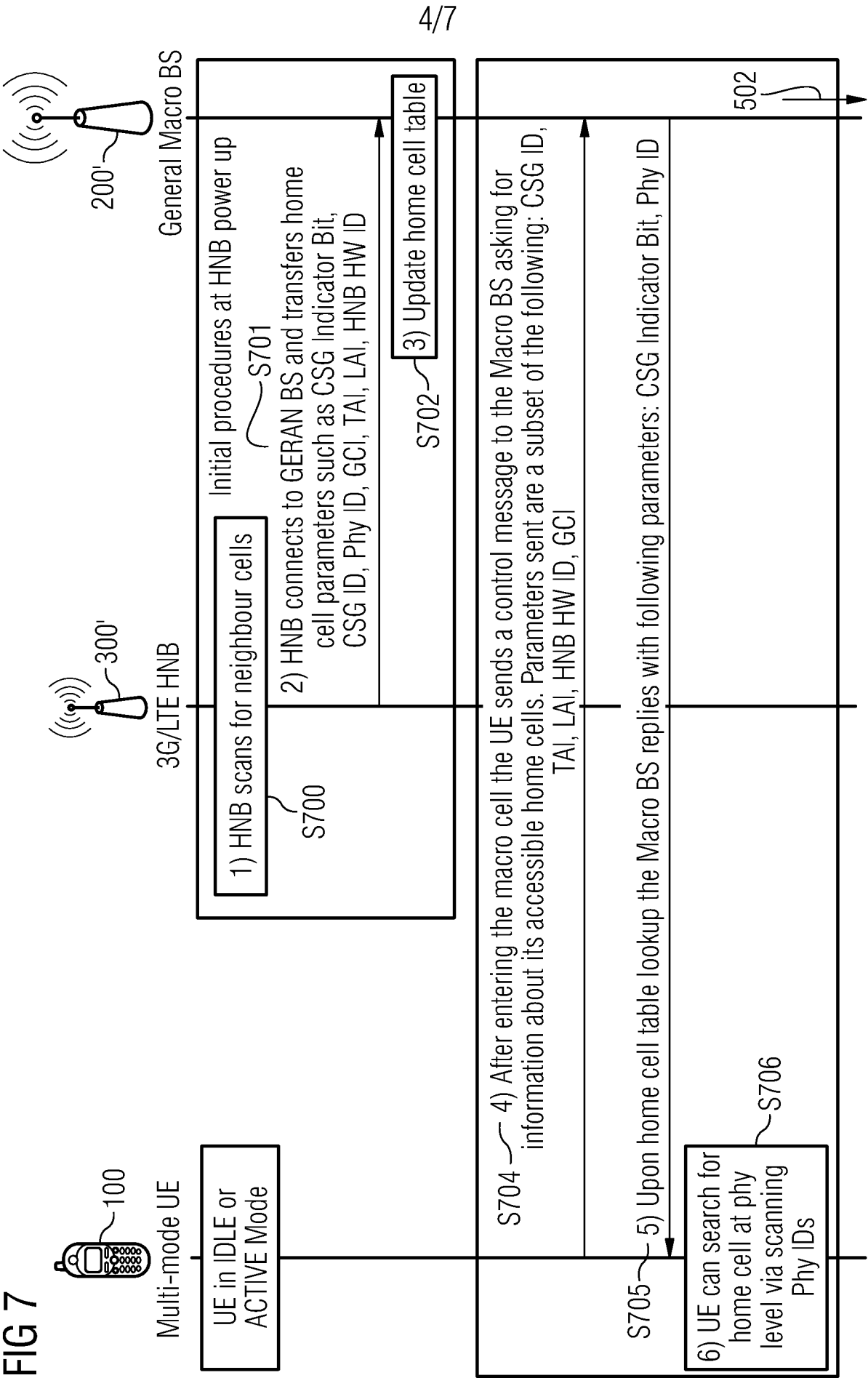
FIG 4





**FIG 6**

|    |              |             |          |           |           |                  |                |
|----|--------------|-------------|----------|-----------|-----------|------------------|----------------|
| #1 | CSG ID = 10  | Phy ID = 04 | GCI = 17 | TAI = 47  | LAI = N/A | CSG Ind. Bit = 1 | HNB HW ID = 53 |
|    |              |             |          |           |           |                  |                |
| #2 | CSG ID = N/A | Phy ID = 13 | GCI = 91 | TAI = N/A | LAI = 77  | CSG Ind. Bit = 1 | HNB HW ID = 12 |
|    |              |             |          |           |           |                  |                |
| #3 | CSG ID = 14  | Phy ID = 04 | GCI = 88 | TAI = 49  | LAI = N/A | CSG Ind. Bit = 1 | HNB HW ID = 03 |
|    |              |             |          |           |           |                  |                |
| #4 | CSG ID = 97  | Phy ID = 11 | GCI = 42 | TAI = 47  | LAI = N/A | CSG Ind. Bit = 1 | HNB HW ID = 67 |
|    |              |             |          |           |           |                  |                |
| .  | .            | .           | .        | .         | .         | .                | .              |
| .  | .            | .           | .        | .         | .         | .                | .              |
| .  | .            | .           | .        | .         | .         | .                | .              |



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FIG 8

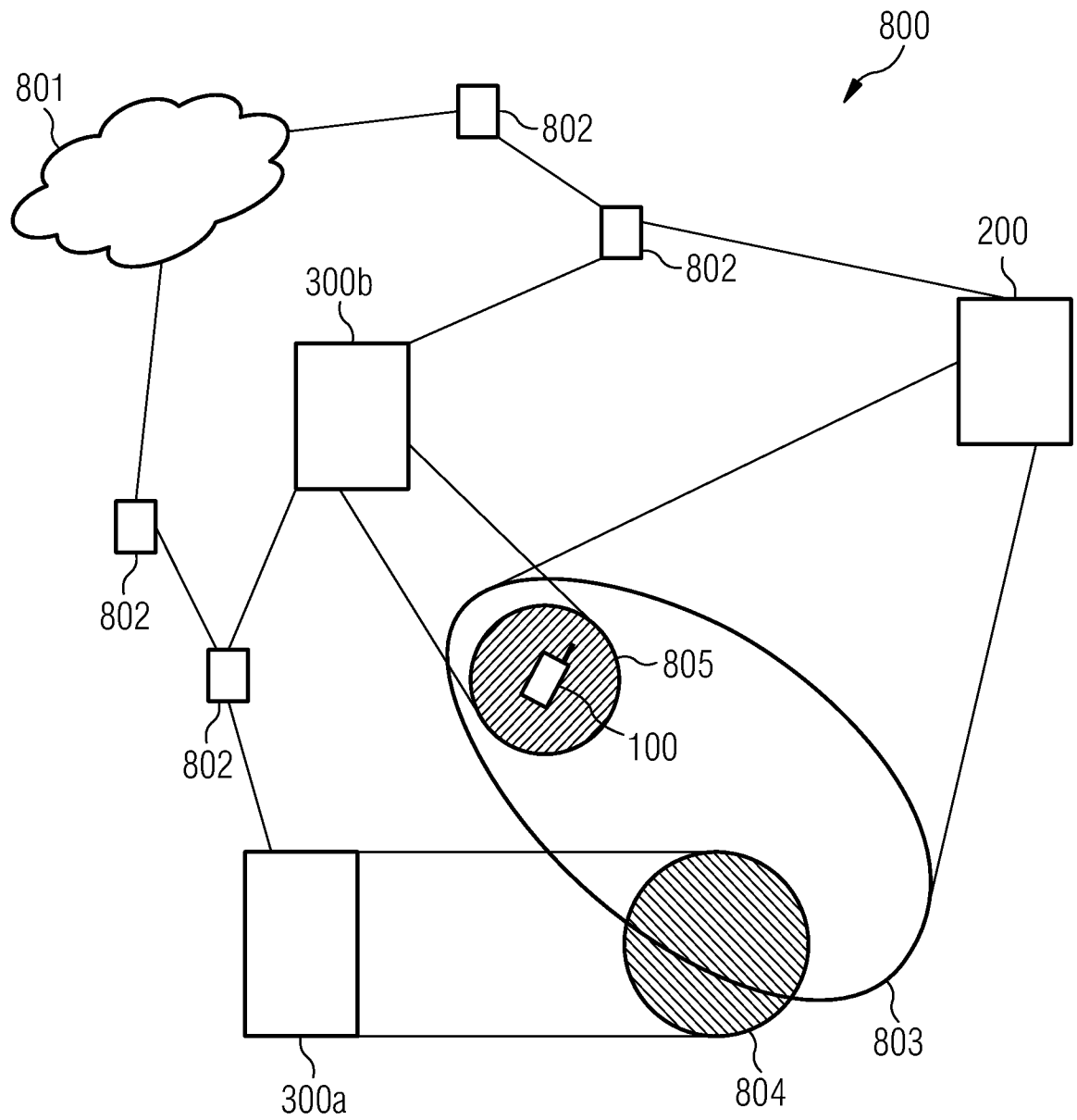
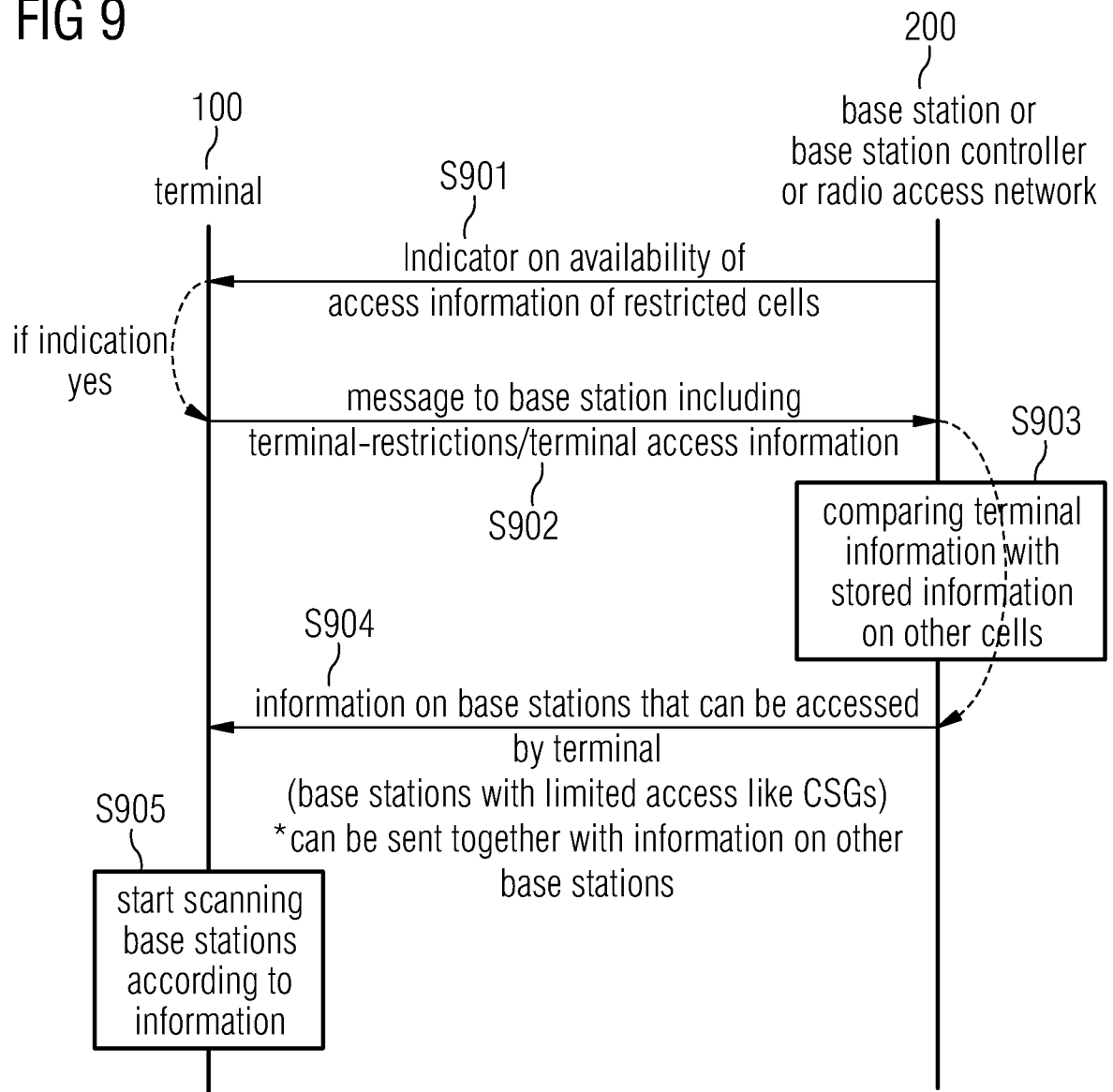
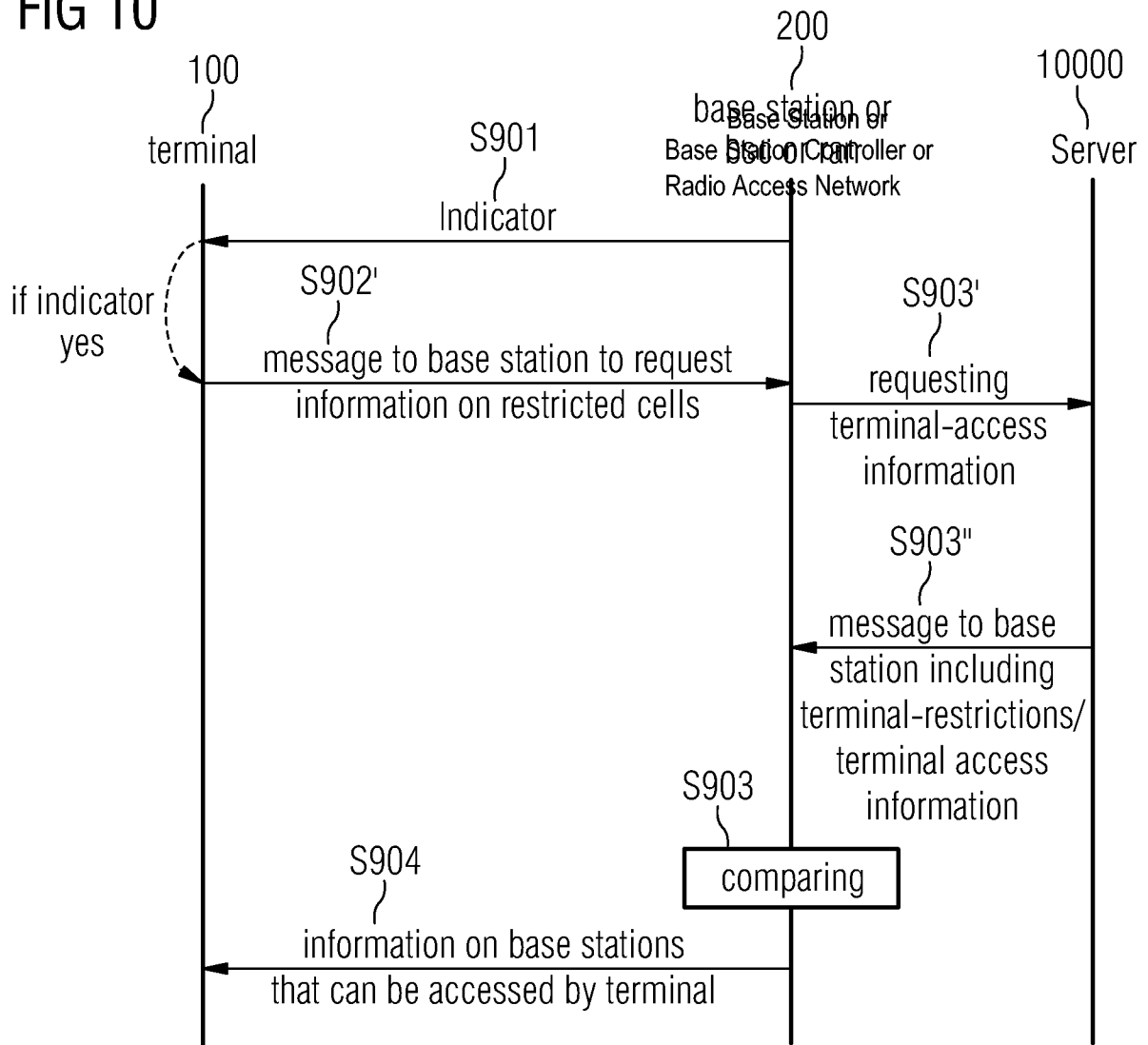


FIG 9



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FIG 10



# INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2008/061051

## A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W48/08

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

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W

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

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

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                       | Relevant to claim No.              |
|-----------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| X         | US 2003/174667 A1 (KRISHNAMURTHI GOVIND<br>[US] ET AL) 18 September 2003 (2003-09-18)                                    | 1-4,<br>14-16,<br>27-29,<br>31, 33 |
| Y         | paragraph [0019]<br><br>paragraphs [0025] - [0029]<br>paragraphs [0032] - [0036]<br>figures 1,2<br><br>-----<br><br>-/-- | 5-12,<br>17-22                     |

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

14 May 2009

Date of mailing of the international search report

08/09/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
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Fax: (+31-70) 340-3016

Authorized officer

Mele, Marco

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2008/061051

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                  | Relevant to claim No.              |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Y         | QUALCOMM EUROPE: "Restricted Association for HNBs"<br>3GPP DRAFT; R2-075125, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, no. Jeju; 20071105, 29 October 2007 (2007-10-29), XP050137579 | 5-11,<br>17-22                     |
| A         | the whole document                                                                                                                                                                                                                                                                  | 1-4,<br>14-16,<br>27-29,<br>31,33  |
| Y         | -----<br>US 2007/232312 A1 (GALLAGHER MICHAEL D [US] ET AL) 4 October 2007 (2007-10-04) paragraphs [0124], [0125]                                                                                                                                                                   | 12                                 |
| A         | paragraphs [0130] - [0132]<br>-----                                                                                                                                                                                                                                                 | 1-11,<br>14-22,<br>27-29,<br>31,33 |
| A         | EP 1 531 645 A (MATSUSHITA ELECTRIC IND CO LTD [JP]) 18 May 2005 (2005-05-18)<br><br>abstract                                                                                                                                                                                       | 1-12,<br>14-22,<br>27-29,<br>31,33 |
| A         | -----<br>US 2007/064650 A1 (LOHTIA ANIT [US] ET AL) 22 March 2007 (2007-03-22)<br><br>abstract                                                                                                                                                                                      | 1-12,<br>14-22,<br>27-29,<br>31,33 |
| A         | -----<br>US 2008/198811 A1 (DESHPANDE MANOJ M [US] ET AL) 21 August 2008 (2008-08-21)<br><br>abstract                                                                                                                                                                               | 1-12,<br>14-22,<br>27-29,<br>31,33 |
| A         | -----<br>US 2007/093201 A1 (HSU RAYMOND T [US] ET AL) 26 April 2007 (2007-04-26)<br><br>abstract                                                                                                                                                                                    | 1-12,<br>14-22,<br>27-29,<br>31,33 |

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2008/061051

### Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-12, 14-22, 27, 28, 29, 31, 33

#### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-12, 14-22, 27, 28, 29, 31, 33

a method, a terminal, a computer element and a base station for indicating to a terminal the presence of an accessible second cell meeting a terminal-specific restriction information.

---

2. claims: 13, 30

a method and a terminal for accessing a cell.

---

3. claims: 23-26, 32

a method and a base station for providing an access parameter to a first Base Station by a second Base Station.

---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2008/061051

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)                                                                                                                                                                            | Publication<br>date                                                                                                                                    |
|-------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| US 2003174667 A1                          | 18-09-2003          | AU 2003228330 A1<br>EP 1486080 A1<br>WO 03079700 A1                                                                                                                                                   | 29-09-2003<br>15-12-2004<br>25-09-2003                                                                                                                 |
| US 2007232312 A1                          | 04-10-2007          | NONE                                                                                                                                                                                                  |                                                                                                                                                        |
| EP 1531645 A                              | 18-05-2005          | BR PI0416563 A<br>CN 1902978 A<br>WO 2005051026 A1<br>JP 2007511147 T<br>KR 20060123309 A<br>US 2007110009 A1                                                                                         | 27-02-2007<br>24-01-2007<br>02-06-2005<br>26-04-2007<br>01-12-2006<br>17-05-2007                                                                       |
| US 2007064650 A1                          | 22-03-2007          | WO 2007044134 A1                                                                                                                                                                                      | 19-04-2007                                                                                                                                             |
| US 2008198811 A1                          | 21-08-2008          | WO 2008103858 A2                                                                                                                                                                                      | 28-08-2008                                                                                                                                             |
| US 2007093201 A1                          | 26-04-2007          | BR PI0407770 A<br>CA 2516923 A1<br>CN 1754345 A<br>CN 101282264 A<br>EP 1597869 A2<br>HK 1089578 A1<br>JP 2006518975 T<br>KR 20050104388 A<br>MX PA05009042 A<br>US 2004176024 A1<br>WO 2004077753 A2 | 01-03-2006<br>10-09-2004<br>29-03-2006<br>08-10-2008<br>23-11-2005<br>13-02-2009<br>17-08-2006<br>02-11-2005<br>23-11-2005<br>09-09-2004<br>10-09-2004 |