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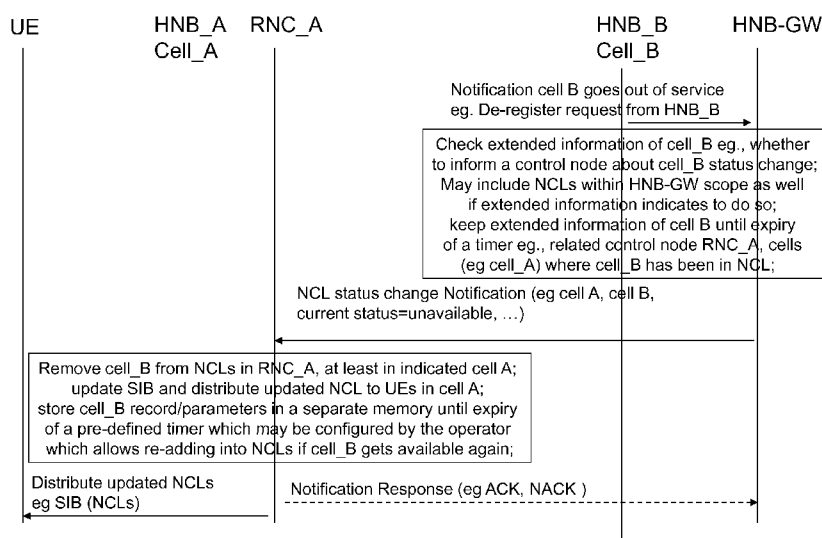
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- (54) **Title:** EVALUATING A CELL IN A COMMUNICATIONS NETWORK

**FIG. 5**

- (57) **Abstract:** To evaluate a cell in a communications network, a method is provided, which includes identifying at a first control node related to a first cell a second control node related to a second cell having a neighbour cell relationship to the first cell, including the second cell in a neighbour cell list of the first control node, sending a notification from the first control node to said second control node that the second cell has been included in the neighbour cell list of the first control node, and receiving a notification of a status change of the second cell from the second control node.

DESCRIPTION

TITLE

5 EVALUATING A CELL IN A COMMUNICATIONS NETWORK

FIELD OF THE INVENTION

10 The invention generally relates to evaluating a cell in a communications network. More particularly, the invention relates to neighbour cell relationships between femto cells or between a femto cell and a macro cell.

BACKGROUND OF THE INVENTION

15 Femto cells are small cellular base stations designed for use in the home or business environment and are connected to the mobile network operator's macro network. They are becoming ever more important as they provide improved network coverage indoors, amongst other advantages.

20 Neighbour cell relationships and neighbour cell lists (NCLs) in a radio network controller (RNC) are generally established by Automatic Neighbor Relation (ANR) functions using a mobile device or user equipment (UE). NCLs may include cells which are under control of a
25 different RNC, which could be the RNC associated with a macro cell or a Home Node B Gateway (HNB-GW) associated with a femto cell.

In the case that a neighbour cell is a femto cell accessible to a UE via a Home Node B (HNB), that cell may be switched off and no longer available to the mobile network operation. When the HNB-cell is switched on again, the HNB-cell could be added to the ANR / NCL again but requires the start of the ANR procedure, and consequently UE measurements on the HNB-cell, before updating the ANR/ NCLs in the first RNC. Therefore, the ANR / NCL may get out of synchronisation in the RNC, causing unnecessary battery consumption for the UEs and possible leading to a reduced QoS for the UE due to unsuccessful UE measurements.

SUMMARY OF THE INVENTION

Accordingly, embodiments of the invention provide a method of evaluating a cell in a communications network. The method includes identifying at a first control node related to a first cell a second control node related to a second cell, which has a neighbour cell relationship to the first cell, and including the second cell in a neighbour cell list of the first control node. A notification is sent from the first control node to the second control node that the second cell has been included in the neighbour cell list of the first control node. The first control node receives a further notification of a status change of the second cell from the second control node.

The notifications may be sent between the first and second control nodes by establishing communication between the first and second control nodes over an

interface after the addition of the second cell to the neighbour cell list or neighbour relation table of the first control node. An information element containing the notification(s), to be exchanged between the first and second control nodes, should ideally contain sufficient information to unambiguously identify the particular neighbouring cell (the first cell) at the second control node.

In this way, the neighbour relation list of the first control node may be updated more quickly in case the second cell (e.g. a femto neighbour cell) is de-registered and re-registered again. This mitigates the problem of unnecessary neighbour cell list updates, giving space in the list for new neighbours and relieving subscriber stations from the burden of extensive measurements of cells that are not actually neighbour cells. Furthermore, the updates from the second control node in case of a re-registration of a previously used second cell saves time and resources in re-including the cell in the neighbour relation list of the first control node. In addition, many settings remain unchanged, which means that re-adding a cell to neighbour cell list is a simple operation not requiring further measurements.

In one embodiment, the step of identifying may include receiving a cell measurement at the first control node and applying an automatic neighbour relation function to the received cell measurement to determine whether the second cell has a neighbour cell relationship to the first cell.

The second cell may be removed from the neighbour cell list of the first control node if the received notification of the status change of the second cell indicates that the status of the second cell has changed to unavailable.

Additionally, received information related to the second cell may be stored at the first control node if the notification of the status change of the second cell indicates that the status of the second cell has changed to unavailable. This received information can be stored in a dedicated storage area of the first control node.

An unavailable status may indicate that the second cell related to the second control node has changed its transmit power to a lowest possible value (as well as simply being switched off or unavailable). In this state, the first cell related to the first control node will regard the second cell as unavailable too.

Updated neighbour cell list information may be sent to all cells under control of the first control node.

In one embodiment, the received information is stored at the first cell until a notification is received that the status of the second cell has changed to available.

In another embodiment, the received information is stored at the first cell until a pre-determined timer has expired indicating that the second cell is allowed to be re-introduced to the neighbour cell list at the first control node. In this case, if a notification is received that the status of the second cell has changed to available before the pre-determined timer has expired, the timer may be stopped and the received information removed from storage.

Then the second cell can be added to the neighbour cell list at the first control node when the received information is no longer stored at the first control node.

Embodiments of the invention also provide a first control node. The first control node is related to a first cell of the communications network and includes a measurement unit configured to identify a second control node related to a second cell having a neighbour cell relationship to the first cell. The first control node also includes a processing unit and a storage unit, wherein the processing unit is configured to include the second cell in a neighbour cell list of the first control node stored in the storage unit. A transmit/receive unit is provided, which is configured to send a notification from the first control node to the second control node that the second cell has been included in the neighbour cell list of the first control node, and to receive a notification of a status change of the second cell from the second control node.

The first control node may be a radio network controller of a macro cell and can establish communication with a second control node, which may be a HNB-GW associated with a femto cell, over an interface. Notifications may be sent over the interface in an information element.

This provides the advantage that the first control node may update its neighbour relation list more quickly in case the second cell (e.g. a femto neighbour cell) is de-registered and re-registered again. This mitigates the problem of unnecessary neighbour cell list updates in the first control node, giving space in the list for new neighbours. Furthermore, the first control node can retrieve information about neighbour cells itself, without the need for subscriber stations to perform extensive cell measurements.

Embodiments of the invention further provide a computer program product including a program comprising software code portions being arranged, when run on a processor, to perform identifying at a first control node related to a first cell a second control node related to a second cell having a neighbour cell relationship to the first cell, including the second cell in a neighbour cell list of the first control node, sending a notification from the first control node to the second control node that the second cell has been included in the neighbour cell list of the first control node, and receiving a notification of a status change of the second cell from the second control node.

Preferably, the computer program product includes a computer-readable medium on which the software code portions are stored, and/or wherein the program is directly loadable into a memory of the processor.

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The invention will now be described, by way of example only, with reference to specific embodiments and to the accompanying drawings, in which:

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BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a simplified schematic diagram of a wireless communications network;

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Figure 2 is a simplified schematic diagram of a control node for a communications network according to an embodiment of the invention;

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Figure 3 is a flow diagram illustrating a method according to an embodiment of the invention;

Figure 4 is a message flow diagram illustrating a method according to an embodiment of the invention;

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Figure 5 is a message flow diagram illustrating a method according to an embodiment of the invention; and

Figure 6 is a message flow diagram illustrating a method according to an embodiment of the invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

5 Figure 1 shows a UMTS communications network, which includes two cells Cell_A and Cell_B, which are neighbouring cells over an RNC boundary Rb. A subscriber station or user equipment (UE) 1 is served by Cell_A, which is a macro cell. Cell_A is a macro cell which
10 belongs to a serving radio network controller (SRNC) RNC_A, which controls a Node B NB_A over an Iub interface. Cell_B is a femto cell, which belongs to a home node B gateway (HNB-GW) 7, which is a neighbouring control node of the SRNC RNC_A.

15

Although in this example, the configuration shown in Figure 1 is applicable to a scenario where the other RNC entity to the SRNC RNC_A is a HNB-GW, (which has RNC-like functionalities) and Cell_B represents a home Node B
20 (HNB) HNB_B being controlled by the abovementioned HNB-GW 7, Cell_B could also be a macro cell controlled by another RNC.

Figure 2 shows the configuration of the SRNC RNC_A
25 according to one embodiment. However, the configuration shown in Figure 2 may apply to any control node or RNC-like entity in the network, including the HNB-GW 7 controlling the femto cell Cell_B neighbouring Cell_A.

The SNRC RNC_A includes a transmit/receive unit 2 and a measurement unit 3 for identifying or detecting other RNCs or HNB-GWs related to neighbour cells, a processor 4, a data storage unit 5 for storing NCLs and other neighbour cell parameters and information, and a timer 6.

The femto cell Cell_B accessible via the HNB_B may have different capabilities compared to the macro cell Cell_A accessible via the normal Node B NB_A since it has reduced radio coverage and can be deployed in such a way that its physical layer identification (PSC value) does not unambiguously identify its physical entity (which is a recognized condition called PSC confusion).

In addition, the femto cell Cell_B can be switched on or off for various reasons such as interference mitigation, user preferences, power savings, etc. This leads to the conclusion that the femto cell Cell_B may be added to a Neighbour Relation List (NCL) or table of the macro cell Cell_B as a result of automatic neighbour relation (ANR) measurements by the UE 1 (especially since open access mode high-output power femto cells are likely to be deployed in places like shopping malls, airports, etc). However, the femto cell Cell_B may be deregistered (switched off) for various reasons, causing the established neighbour relation information in the NCL to become invalid.

Information on neighbour cells for handover (HO) purposes is provided to Cell_A, the serving cell to the UE 1,

by the serving ANR capable Node B based on earlier established neighbour relations. The UE 1 then measures these neighbour cells and reports them to the network, as well as storing an ANR log. The list of possible

5 neighbours is limited (the common information broadcasted to all camping UEs is limited to 32 neighbours per frequency/RAT), hence it may occur that other valid neighbour cells may not be included in the list due to an invalid (non-existing) entry taking space in the NCL.

10 Furthermore, in connected mode the dedicated measurement configuration message may have limits in terms of neighbour cell entries on the NCL. Additionally, invalid neighbour cell entries on the NCL may cause the UE 1 to perform measurements longer, which has a detrimental

15 effect on battery life and network performance. An important aspect to be considered is also the fact that a switched-off and again switched-on femto cell could be assigned a different PSC number when it is switched on again. This could again be added by the ANR capable Node

20 B as a neighbouring cell, even though the ANR neighbour relation table (NCL) already contains an entry for this cell (albeit under a different PSC value). If this

procedure were to be repeated several times, this could use up a significant amount of space on the neighbour

25 cell list with invalid entries or could cause repeated ANR measurements by the UE, which should be avoided due to the nature of having a detrimental effect on battery life or radio transmission (if scheduled in a CELL_DCH state). Therefore, special procedures for treatment of

30 ANR procedures in femto cells are necessary.

Figure 3 is a flow chart illustrating an embodiment of the invention. In step S1, the SRNC RNC_A identifies the HNB-GW 7 as being an RNC-like entity related to a cell having a neighbour cell relationship to Cell_A; i.e.,
5 Cell_B. In Step S2, the RNC_A includes Cell_B in its neighbour cell list stored in the database 5. The transmit/receive unit 2 of the RNC_A sends a notification to the HNB-GW 7 in step S3 that Cell_B has been included in its neighbour cell list and receives a notification in
10 step S4 from the HNB-GW 7 if the status of Cell_B has changed, for example from available (switched on or in operation) to unavailable (switched off or has reduced its power to a predetermined level or lowest possible power level) or vice versa.

15 In step S1, the RNC_A may receive a cell measurement and apply an automatic neighbour relation function to the received cell measurement to determine whether Cell_B really does have a neighbour cell relationship to Cell_A.

20 If in step S4 the RNC_A receives a notification of the status change of Cell_B, which indicates Cell_B is unavailable, Cell_B can be removed from the neighbour cell list stored in the RNC_A. The RNC_A can then also
25 store received information related to Cell_B in the database 5 if the status of the Cell_B has changed to unavailable and can keep this information stored until a notification is received that Cell_B is available again. The database 5 can be provided with a dedicated storage
30 area for this information.

Alternatively, this information can be stored in the database 5 until the timer 6 has expired after a predetermined time, which indicates that Cell_B is allowed to be re-introduced to the neighbour cell list.

5 If a notification is received at the RNC_A that the status of Cell_B has changed back to available before the timer 6 has expired, the timer 6 is then stopped and the received information related to Cell_B is removed from the database 5. Then Cell_B can be added to the
10 neighbour cell list again when this received information is no longer stored in the database 5.

Every time the NCL is updated at the RNC_A, it can send updated neighbour cell list information to all cells
15 under its control.

In the method according to embodiments of the invention, communication is established between RNC_A and the HNB-GW 7 after the addition of the femto cell Cell_B (controlled
20 by the HNB-GW 7) to the Cell_A NCL. The RNC_A and the HNB-GW 7 exchange information so as to notify the HNB-GW 7 that its cell Cell_B has been added as a neighbouring cell. The information element, to be exchanged between the RNC_A and the HNB-GW 7, should contain sufficient
25 information to unambiguously identify the particular neighbouring femto cell at the HNB-GW 7. After being notified, the HNB-GW 7 may notify the RNC_A in case the HNB_B has been de-registered (switched off) or notify the RNC_A in case the HNB_B has been activated (registered)
30 again and provide additional information whether the

HNB_B was assigned the same or different parameters settings upon being re-activated.

After receiving this information from the HNB-GW 7, the
5 RNC_A may remove the de-registered femto cell Cell_B from
the current neighbour cell list but keep a record of this
cell for a certain period of time in case Cell_B should
be switched on again. The RNC_A may then add Cell_B to
the NCL if Cell_B is still a valid neighbour cell after
10 re-registration. This time Cell_A, having a stored
reference to HNB_B from its previous registration
(addition to the neighbour relation table before being
removed) would not need to instruct the UE 1 to perform
ANR measurements but could simply update its old NCL
15 entry with newly assigned parameters provided to the
RNC_A by the HNB-GW 7.

The benefits of this solution are twofold. Firstly, the
neighbour relation information stored in the RNC_A can be
20 updated more quickly in case a femto neighbour cell is
de-registered and re-registered again. This mitigates
the problem of neighbour cell list updates using up space
in the list in place of new neighbours and relieves the
UEs from the burden of extensive measurements on non-
25 existent neighbour cells. Secondly the updates from the
HNB-GW 7 in case of a re-registration of a previously
used femto cell Cell_B saves time and resources when
including the cell in the neighbour relation information
again. Re-adding a cell to neighbour cell list is then a
30 simple operation not requiring further measurements.

These advantages are provided by the communication
between the RNC_A and the HNB-GW 7 in relation to ANR,

as well as the new information element (IE) exchanged between these entities and usage of the information provided within this IE. This is especially provided for by the behaviour of the RNC_A to notify the HNB-GW 7 about its HNB HNB_B in Cell_B being added to the neighbour cell list, as well as the HNB-GW 7 notifying the RNC_A of the changes in the status of the HNB HNB_B (Cell_B). Further advantages are provided by the functionality in the RNC_A to remove a cell from the NCL but keep a record of that cell for a given (defined or network operator configured) period of time in case the cell should be switched on again so that the cell may be re-added to the neighbour relation information. Still further advantages are provided by the HNB-GW 7 sending a notification to the RNC_A about a new parameter set for a re-registered cell Cell_B which was previously listed as a neighbour cell in the RNC_A.

More specific examples relating to the implementation of embodiments of the invention are described below and illustrated in the message flow diagrams shown in Figures 4 to 6.

In one embodiment, the RNC_A orders ANR measurements in Cell_A in order to discover neighbour cells and the UE 1 reports the neighbouring HNB HNB_B as a valid neighbour cell. The RNC_A needs to find out that a femto cell Cell_B has been reported. The RNC_A may determine this, for example, based on the PSC value of the cell, since femto cells can be assigned PSC values from a given range; by the frequency band used by the reported cell (in the case that femto cells are deployed on a dedicated frequency); by the output power of the reported cell; by

the Global Cell ID of the reported cell; or by any combination of these factors.

The RNC_A also needs to correctly address the HNB-GW 7
controlling the neighbouring cell Cell_B. This may be
achieved based on a reported Global Cell ID. When it has
all the required information, the RNC_A provides this
information to the HNB-GW 7 in a special Information
Element (IE) via the appropriate communication protocol.
The Information Element includes: HNB Cell Global ID; HNB
PSC; HNB-GW address; CELL_A Global Cell ID (for feedback
purposes); reason for sending this message (addition,
removal of neighbour cell from NCL); and any other
required information.

Once received by the HNB-GW 7, this information is stored
and used in case the HNB_B is switched off (de-
registered) for any reason. In the case where the HNB_B
is de-registered, the HNB-GW 7 sends a message to the
RNC_A, using the stored information, which informs the
RNC_A that the HNB_B has been switched off (or is
operating at its lowest possible power). The HNB-GW 7
may also provide the HNB PSC value before the HNB_B is
switched off, as well as the reason for de-registration
and other information.

On reception of this message, the RNC_A removes the cell
Cell_B associated with the HNB_B from the relevant
neighbour relation tables/lists, updating all possible
lists where this cell Cell_B could be listed (e.g. the
neighbour cell list broadcasted in System Information
Blocks). Additionally, the RNC_A may store data relating
to the removed HNB cell in a special register in the

database 5 and start the timer 6, which upon expiry indicates the final deletion of the entry of the de-registered cell Cell_B from the neighbour cell list.

5 If however the HNB_B is registered again at the HNB-GW 7 before the expiry of the timer 6, the HNB-GW 7 may notify the RNC_A that the HNB_B could be again restored as a neighbouring cell in the neighbour relation information without the need for the UE 1 to perform any new ANR
10 measurements. The timer 6 could be configured in the O&M system in the CN. Alternatively, the timer 6 may be preconfigured or set by any other possible means according to operator preferences, for example.

15 If the RNC_A receives information that the previously de-registered neighbouring HNB_B(or Cell_B) has been switched on again, and can be added back to the neighbour relation information, the RNC_A may add the HNB_B (Cell_B) back to the neighbour relation list using the
20 information already stored and updating only any new information provided by the HNB-GW 7, for example the new PSC value.

25 For the purpose of the present invention as described hereinabove, it should be noted that

- method steps likely to be implemented as software code portions and being run using a processor at a network control element or terminal (as examples of devices, apparatuses and/or modules thereof, or as examples of
30 entities including apparatuses and/or modules therefore), are software code independent and can be specified using any known or future developed programming language as

long as the functionality defined by the method steps is preserved;

- generally, any method step is suitable to be implemented as software or by hardware without changing the idea of the embodiments and its modification in terms of the functionality implemented;

- method steps and/or devices, units or means likely to be implemented as hardware components at the above-defined apparatuses, or any module(s) thereof, (e.g., devices carrying out the functions of the apparatuses according to the embodiments as described above) are hardware independent and can be implemented using any known or future developed hardware technology or any hybrids of these, such as MOS (Metal Oxide

Semiconductor), CMOS (Complementary MOS), BiMOS (Bipolar MOS), BiCMOS (Bipolar CMOS), ECL (Emitter Coupled Logic), TTL (Transistor-Transistor Logic), etc., using for example ASIC (Application Specific IC (Integrated Circuit)) components, FPGA (Field-programmable Gate Arrays) components, CPLD (Complex Programmable Logic Device) components or DSP (Digital Signal Processor) components;

- devices, units or means (e.g. the above-defined apparatuses and network devices, or any one of their respective units/means) can be implemented as individual devices, units or means, but this does not exclude that they are implemented in a distributed fashion throughout the system, as long as the functionality of the device, unit or means is preserved;

- an apparatus may be represented by a semiconductor chip, a chipset, or a (hardware) module comprising such chip or chipset; this, however, does not exclude the possibility that a functionality of an apparatus or

module, instead of being hardware implemented, be implemented as software in a (software) module such as a computer program or a computer program product comprising executable software code portions for execution/being run on a processor;

- a device may be regarded as an apparatus or as an assembly of more than one apparatus, whether functionally in cooperation with each other or functionally independently of each other but in a same device housing, for example.

In general, it is to be noted that respective functional blocks or elements according to above-described aspects can be implemented by any known means, either in hardware and/or software, respectively, if it is only adapted to perform the described functions of the respective parts. The mentioned method steps can be realized in individual functional blocks or by individual devices, or one or more of the method steps can be realized in a single functional block or by a single device.

Generally, any method step is suitable to be implemented as software or by hardware without changing the idea of the present invention. Devices and means can be implemented as individual devices, but this does not exclude that they are implemented in a distributed fashion throughout the system, as long as the functionality of the device is preserved. Such and similar principles are to be considered as known to a skilled person.

The terms "user equipment (UE)" and "subscriber station" described herein may refer to any mobile or stationary device including a mobile telephone, a computer, a mobile broadband adapter, a USB stick for enabling a device to access to a mobile network, etc.

The exemplary embodiments of the invention have been described above with reference to a 3GPP UMTS network. However, the above-described examples may be applied to any wireless communications network.

Although the invention is described hereinabove with reference to specific embodiments, it is not limited to these embodiments and no doubt further alternatives will occur to the skilled person that lie within the scope of the invention as claimed.

LIST OF ABBREVIATIONS

RNC - Radio Network Controller

HNB - Home NodeB

5 HNB-GW - Home NodeB Gateway

SRNC - Serving RNC

PSC - Primary Scrambling Code

ANR - Automatic Neighbour Relation

NRT - Neighbour Relation Table

10 RAT- Radio Access Technology

HO - Handover

3GPP - 3rd Generation Partnership Project

CLAIMS

1. A method of evaluating a cell in a communications network, the method comprising:

5 identifying at a first control node related to a first cell a second control node related to a second cell having a neighbour cell relationship to the first cell;

including the second cell in a neighbour cell list of the first control node;

10 sending a notification from the first control node to said second control node that the second cell has been included in the neighbour cell list of the first control node; and

15 receiving a notification of a status change of the second cell from the second control node.

2. The method according to claim 1, wherein the step of identifying comprises receiving a cell measurement at the first control node and applying an automatic neighbour relation function to the received cell
20 measurement to determine whether the second cell has a neighbour cell relationship to the first cell.

3. The method according to claim 1 or claim 2, further comprising removing the second cell from the neighbour cell list of the first control node if the received
25 notification of the status change of the second cell indicates that the status of the second cell has changed to unavailable.

4. The method according to any of claims 1 to 3, further comprising storing received information related

to the second cell at the first control node if the notification of the status change of the second cell indicates that the status of the second cell has changed to unavailable.

5 5. The method according to claim 4, wherein the received information is stored in a dedicated storage area of the first control node.

6. The method according to any of claims 3 to 5, wherein an unavailable status indicates that the second
10 cell related to the second control node has changed its transmit power to a lowest possible value.

7. The method according to any of claims 1 to 6, wherein the received information is stored at the first cell until a notification is received that the status of
15 the second cell has changed to available.

8. The method according to any of claims 1 to 6, wherein the received information is stored at the first cell until a pre-determined timer has expired indicating that the second cell is allowed to be re-introduced to
20 the neighbour cell list at the first control node.

9. The method according to claim 8, wherein if the notification is received that the status of the second cell has changed to available before the pre-determined timer has expired, the timer is stopped and the received
25 information is removed from storage.

10. The method according to any of claims 7 to 9, further comprising adding the second cell to the neighbour cell list at the first control node when the received information is no longer stored at the first
30 control node.

11. The method according to any of claims 1 to 10, further comprising sending updated neighbour cell list information to all cells under control of the first control node.

5 12. A first control node for a communications network, wherein the first control node is related to a first cell of the communications network, the first control node comprising:

10 a measurement unit configured to identify a second control node related to a second cell having a neighbour cell relationship to the first cell;

a processing unit;

15 a storage unit, wherein the processing unit is configured to include the second cell in a neighbour cell list of the first control node stored in the storage unit; and

20 a transmit/receive unit configured to send a notification from the first control node to said second control node that the second cell has been included in the neighbour cell list of the first control node, and to receive a notification of a status change of the second cell from the second control node.

25 13. A computer program product including a program comprising software code portions being arranged, when run on a processor, to perform:

identifying at a first control node related to a first cell a second control node related to a second cell having a neighbour cell relationship to the first cell;

including the second cell in a neighbour cell
list of the first control node;

5 sending a notification from the first control
node to said second control node that the second cell has
been included in the neighbour cell list of the first
control node; and

receiving a notification of a status change of
the second cell from the second control node.

10 14. The computer program product according to claim
13, comprising a computer-readable medium on which the
software code portions are stored, and/or wherein the
program is directly loadable into a memory of the
processor.

15

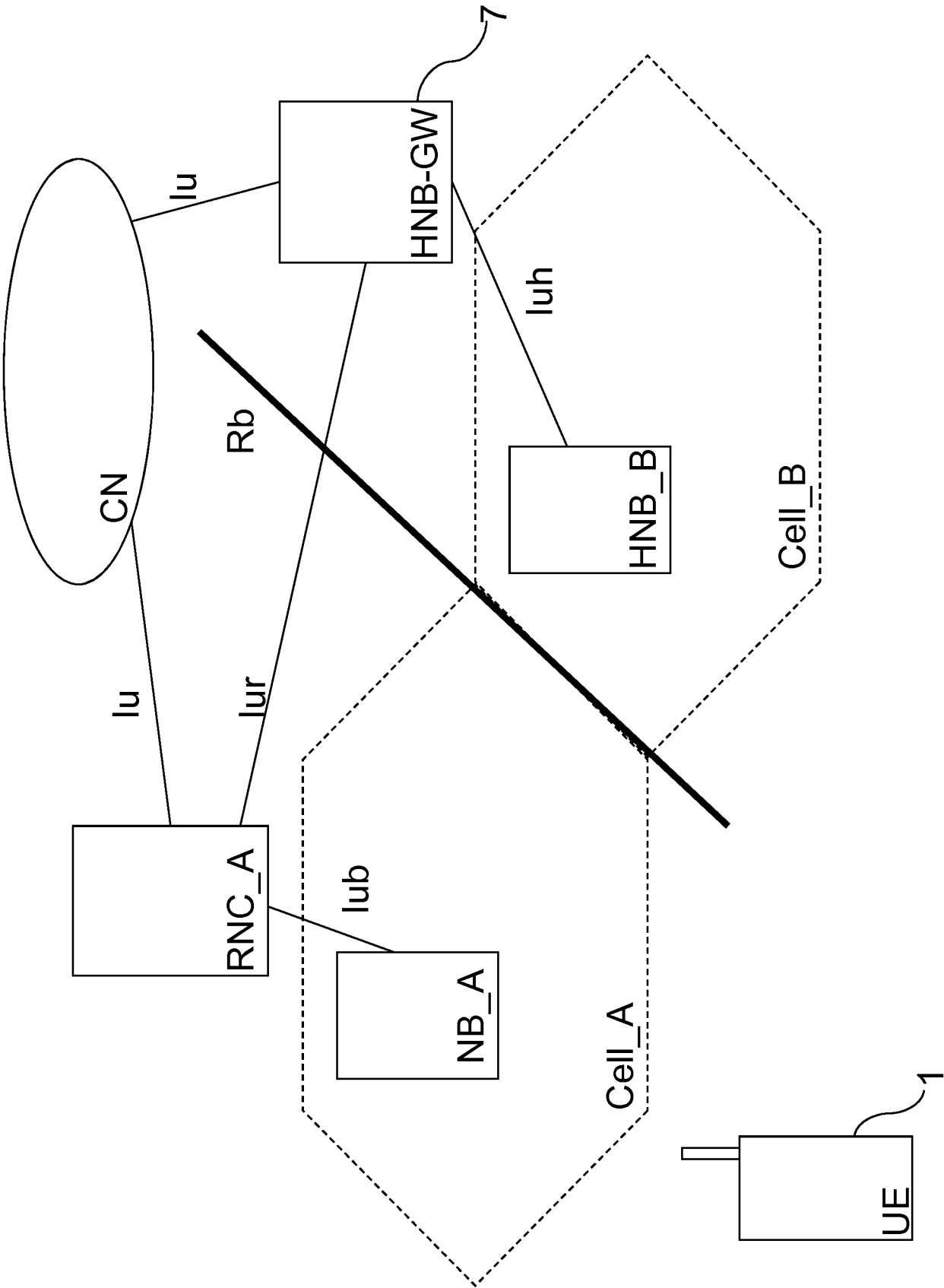


FIG. 1

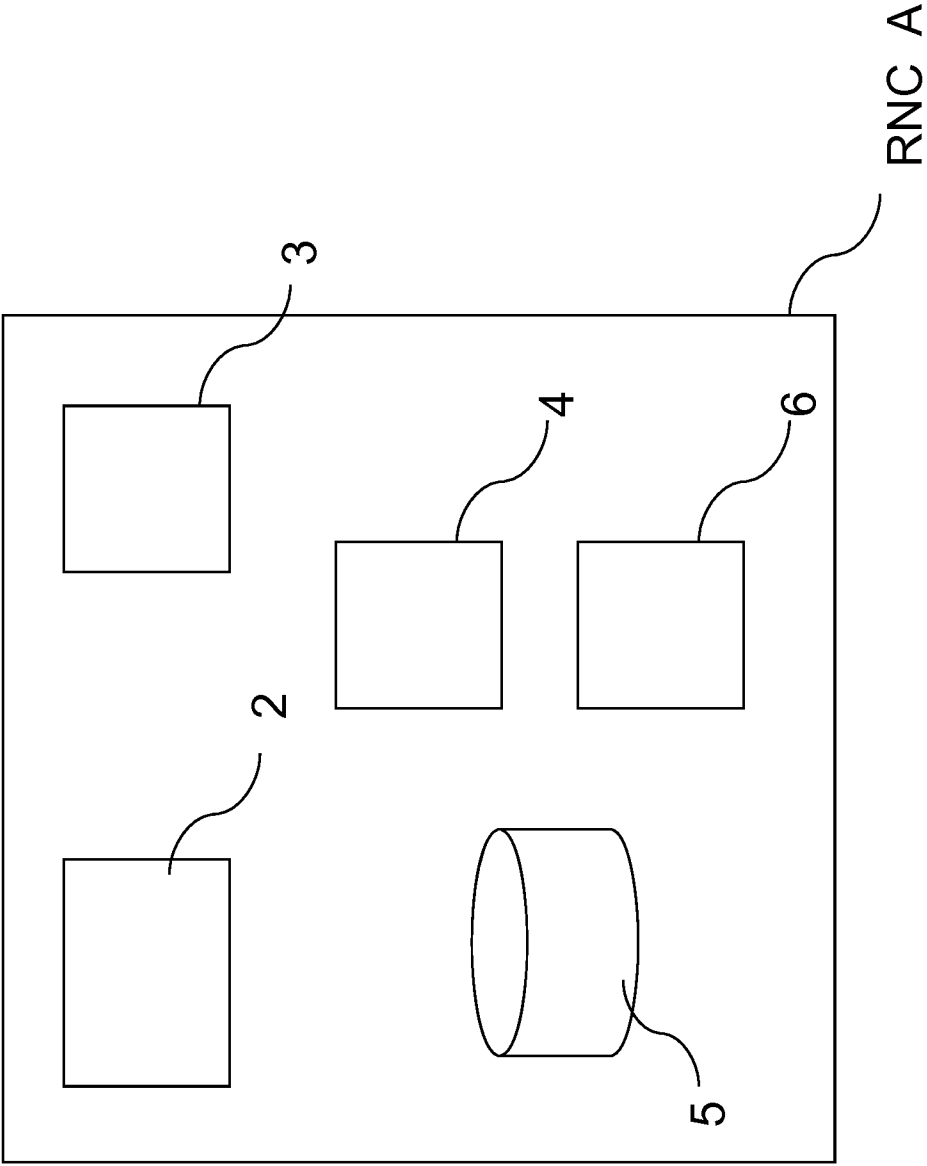


FIG. 2

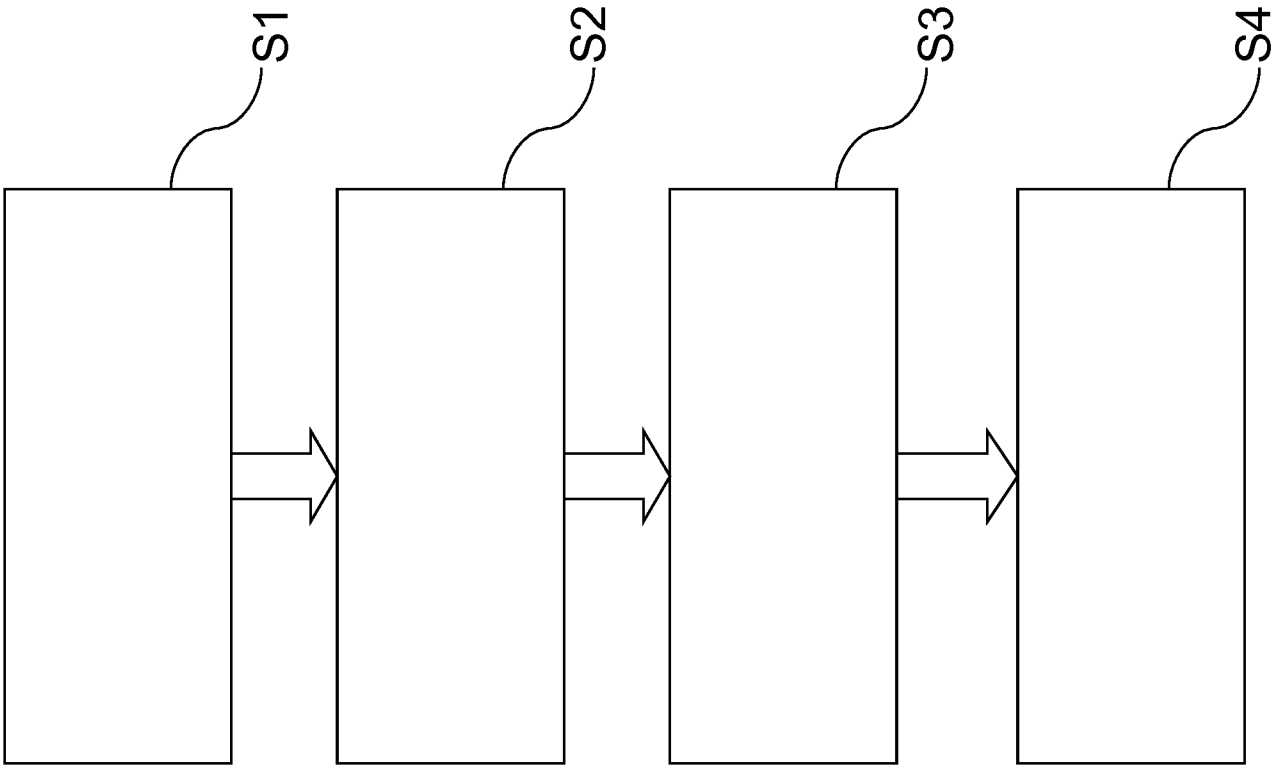


FIG. 3

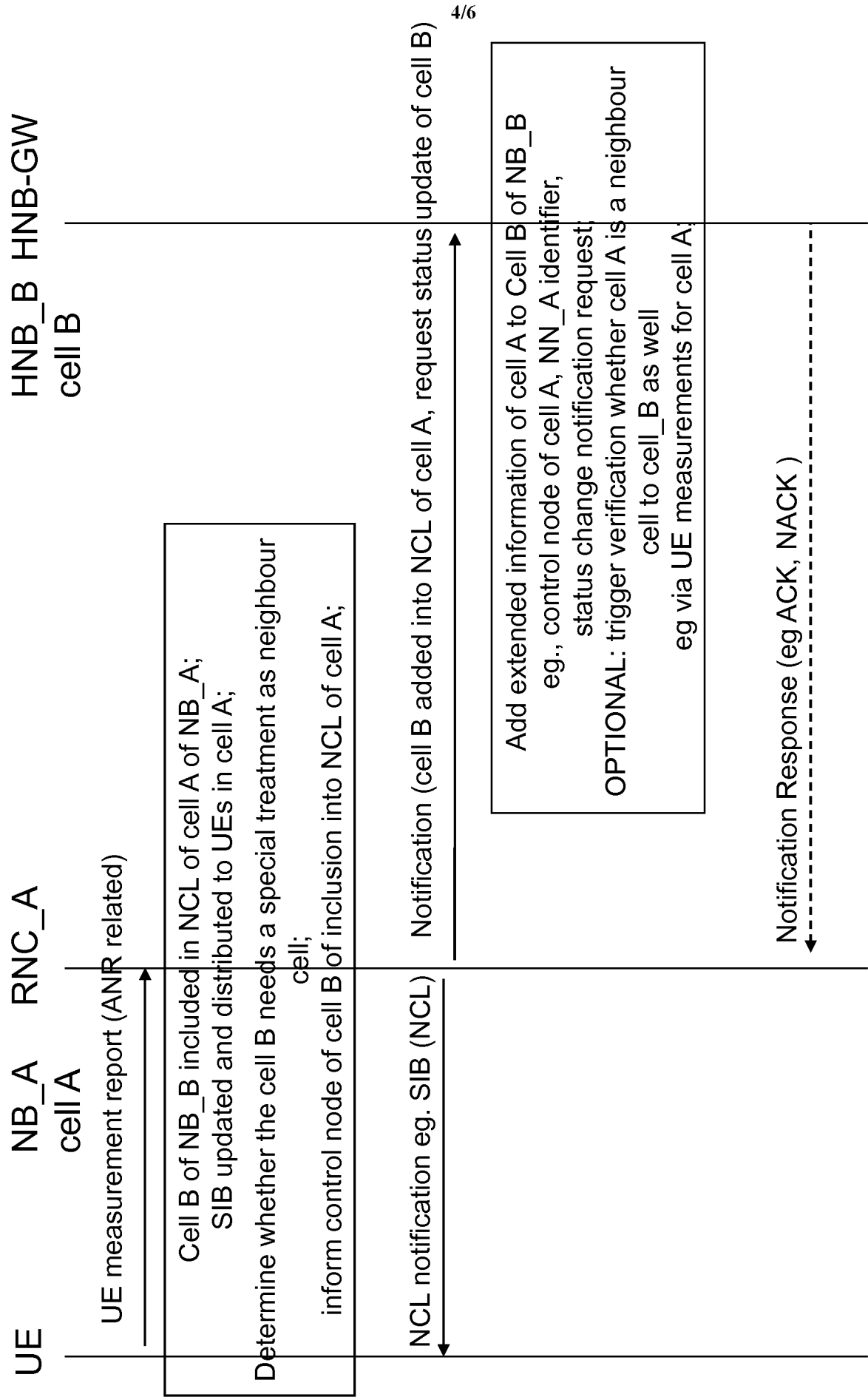


FIG. 4

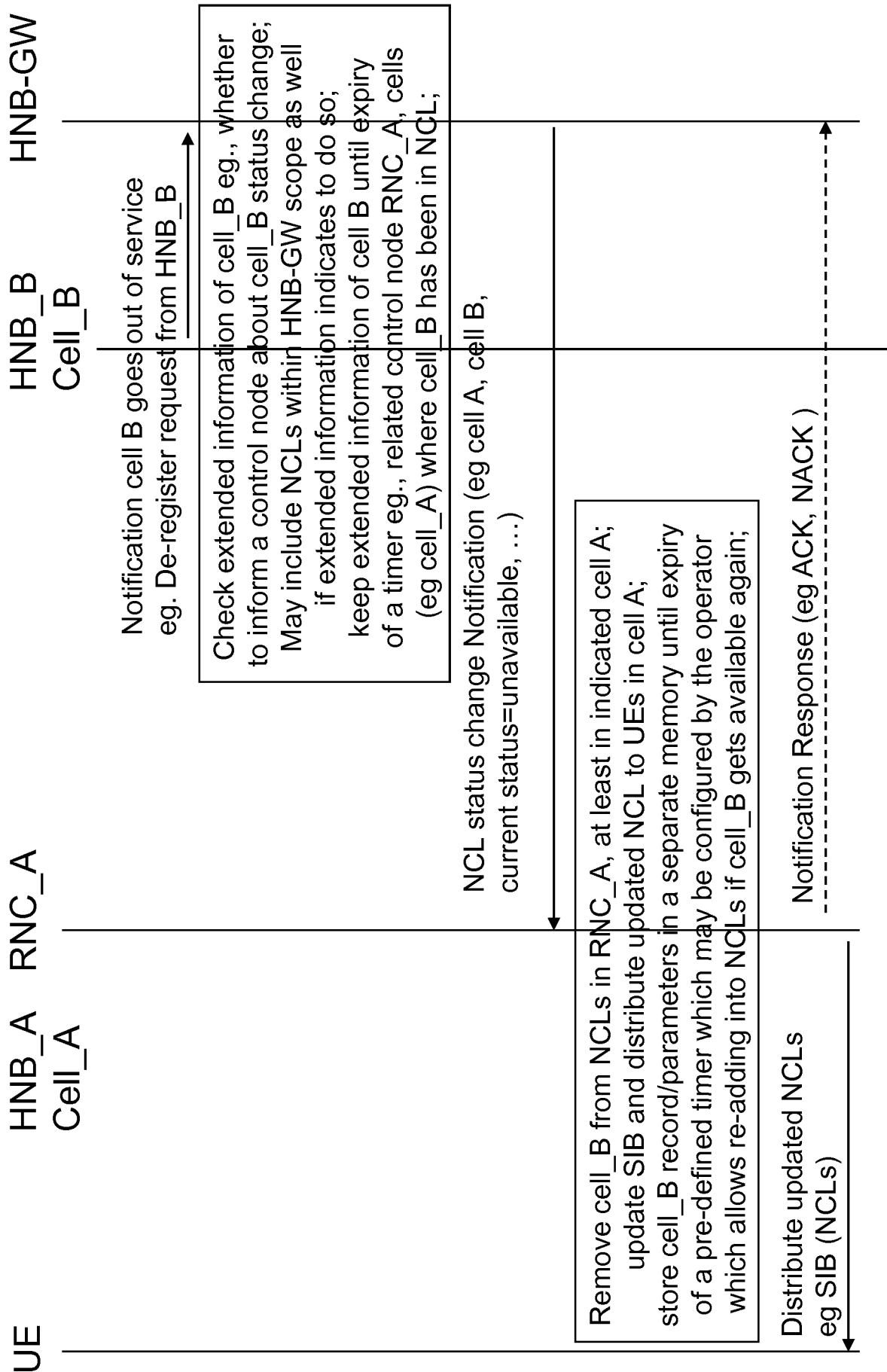


FIG. 5

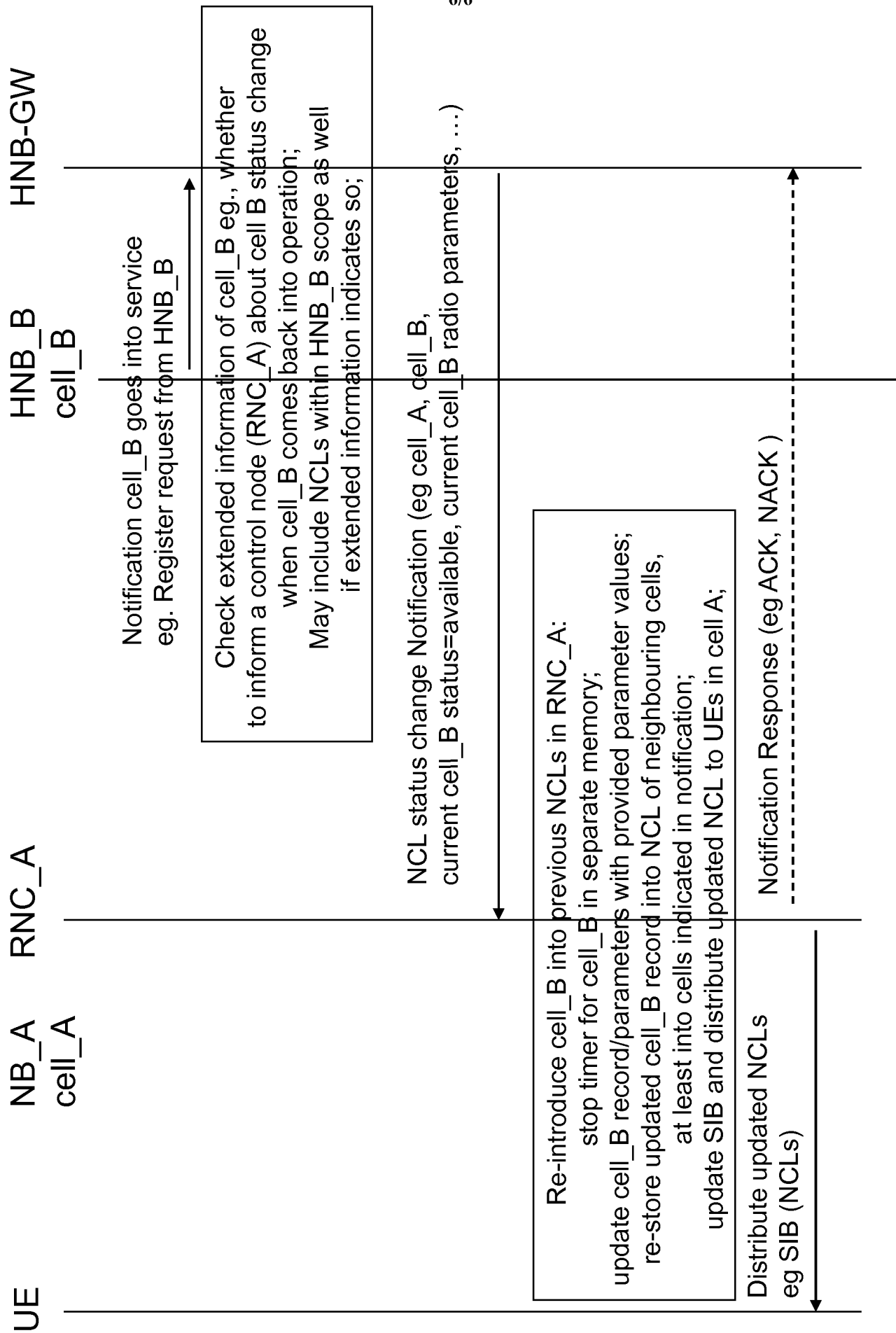


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/057124

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W24/02

ADD. H04W92/22

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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 practicable, 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	WO 2009/022975 A1 (ERICSSON TELEFON AB L M [SE]) 19 February 2009 (2009-02-19) paragraphs [0008], [0009] paragraph [0012] - paragraph [0022] paragraph [0034] paragraph [0048] - paragraph [0052] figure 7	1-14
X	WO 2011/023234 A1 (NOKIA SIEMENS NETWORKS OY [FI]; ZHANG SHUN LIANG [CN]; ZHOU WEI HUA [C]) 3 March 2011 (2011-03-03) page 8, line 6 - line 21 page 10, line 4 - page 11, line 19 page 14, line 5 - page 16, line 2 page 18, line 19 - page 20, line 27 page 21, line 18 - line 31 ----- -/-	1-14



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

21 June 2012

Date of mailing of the international search report

28/06/2012

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

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PCT/EP2012/057124

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	EP 2 141 947 A1 (NOKIA SIEMENS NETWORKS OY [FI]) 6 January 2010 (2010-01-06) paragraphs [0005], [0006], [0010], [0019] paragraph [0027] - paragraph [0032] paragraph [0041] - paragraph [0045] figures 2,5 -----	1-14

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Information on patent family members

International application No

PCT/EP2012/057124

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