

**TSG-RAN Meeting #27**  
**Tokyo, Japan, 09-11 March 2005**

**RP-050081**  
**Agenda item 9.8**

Source: TSG-RAN WG2

Title: 25.304, 25.331 CRs to Rel-6 on correction to "selected PLMN" in access stratum

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.304	125	1	Rel-6	Corrections to "selected PLMN" in access stratum	F	6.4.0	6.5.0	R2-050392	TEI6
25.331	2527	-	Rel-6	Corrections to "selected PLMN" in access stratum	F	6.4.0	6.5.0	R2-050633	TEI6, NTShar-UTRANEnh

## CHANGE REQUEST

⌘ **25.304 CR 125** ⌘ rev **1** ⌘ Current version: **6.4.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Corrections to "selected PLMN" in access stratum		
<b>Source:</b>	⌘ RAN WG2		
<b>Work item code:</b>	⌘ TEI6	<b>Date:</b>	⌘ Feb 14 <sup>th</sup> , 2005
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-6
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		<i>Use one of the following releases:</i> <b>Ph2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>Rel-4</b> (Release 4) <b>Rel-5</b> (Release 5) <b>Rel-6</b> (Release 6) <b>Rel-7</b> (Release 7)

<b>Reason for change:</b>	⌘ During RAN2#44, erroneous usage of the term "selected PLMN" was detected in AS specs 25.331 and 25.304. The aim of this CR is to align the usage of terms in AS specs with the NAS usage.  Example procedure in section 10 are not updated with latest changes in NAS specification.
<b>Summary of change:</b>	⌘ The following proposals are included in this change request: <ol style="list-style-type: none"> <li>1. Definiton of "suitable cell" is updated to be inline with NAS specs and GERAN specs.</li> <li>2. Delate the complte section 10.x as the current version is outdated based on the latest changes in NAS specifications and inconsistency on the requirements is avoided if not this sections is removed from 25.304 completely</li> </ol> <p style="background-color: #90EE90; padding: 5px;"><b>Implementation of this CR by a R'99/Rel4/Rel-5 UE will not cause compatibility issues.</b></p>
<b>Consequences if not approved:</b>	⌘ Identified unclarities/errors remain in the specification and potential misalingment between AS and NAS specs resulting in wrong UE implementations.

<b>Clauses affected:</b>	⌘ 3.1, 4.1, 4.2, 4.3, 5.1.1., 5.2.2.5, 5.2.3.1.1, 5.2.9.1, 10						
<b>Other specs</b>	⌘ <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Y</td><td>N</td></tr><tr><td>X</td><td></td></tr></table> Other core specifications	Y	N	X		⌘ TS 25.331 CR 2527.	
Y	N						
X							

**affected:**

<input checked="" type="checkbox"/>	Test specifications
<input checked="" type="checkbox"/>	O&M Specifications

**Other comments:** ☞

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# 3GPP TS 25.304 V6.4.0 (2004-12)

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*Technical Specification*

## **3rd Generation Partnership Project; Technical Specification Group Radio Access Network; User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode (Release 6)**



The present document has been developed within the 3<sup>rd</sup> Generation Partnership Project (3GPP<sup>TM</sup>) and may be further elaborated for the purposes of 3GPP.

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Keywords

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following definitions and the definitions in [12] apply.

**Acceptable Cell:** A cell that satisfies certain conditions as specified in 4.3. A UE can always attempt emergency calls on an acceptable cell.

**Available PLMN:** A PLMN for which the UE has found at least one cell and read its PLMN identity.

**Barred Cell:** A cell a UE is not allowed to camp on.

**Camped on a cell:** UE has completed the cell selection/reselection process and has chosen a cell. The UE monitors system information and (in most cases) paging information.

**Camped on any cell:** UE is in idle mode and has completed the cell selection/reselection process and has chosen a cell irrespective of PLMN identity.

**DRX cycle:** Individual time interval between monitoring Paging Occasion for a specific UE.

**Equivalent PLMN list:** ~~A List of~~ PLMN~~s~~ considered as equivalent ~~to the selected PLMN~~ by the UE for ~~PLMN selection~~, cell selection, cell reselection and handover according to the information provided by the NAS.

**Home PLMN:** A PLMN where the Mobile Country Code (MCC) and Mobile Network Code (MNC) of the PLMN identity are the same as the MCC and MNC of the IMSI.

**Location Registration (LR):** UE registers its presence in a registration area, for instance regularly or when entering a new registration area.

**Maximum DRX cycle:** Time interval for the longest possible DRX cycle in a cell.

**MBMS Activated Service:** An MBMS service that the UE has joined (multicast) or is interested in (broadcast).

**MBMS Preferred Layer (PL):** A frequency layer that is indicated by the UTRAN to be preferred for camping for MBMS purposes.

**Paging Block Periodicity (PBP):** Period of the occurrence of Paging Blocks. (For FDD, PBP = 1).

**Paging Message Receiving Occasion (TDD only):** The frame where the UE receives actual paging message.

**Paging occasion:**

(FDD) The SFN of the PICH frame where the UE monitors its paging indicator (i.e. the SFN of the PCCPCH frame in which the PICH frame begins).

(TDD) The paging block, which consists of several frames. The value of Paging Occasion is equal to the first frame of the Paging Block.

**Process:** A local action in the UE invoked by a RRC procedure or an Idle Mode procedure.

**Radio Access Mode:** Radio access mode of the cell, FDD or TDD.

**Radio Access Technology:** Type of technology used for radio access, for instance UTRA or GSM.

**Registered PLMN:** [This is the PLMN on which certain Location Registration outcomes have occurred \[5\].](#)

**Registration Area:** (NAS) registration area is an area in which the UE may roam without a need to perform location registration, which is a NAS procedure.

**Reserved Cell:** A cell on which camping is not allowed, except for particular UEs, if so indicated in the system information.

**Restricted Cell:** A cell on which camping is allowed, but access attempts are disallowed for UEs whose access classes are indicated as barred.

**Selected PLMN:** This is the PLMN that has been selected by the NAS, either manually or automatically.

**Serving cell:** The cell on which the UE is camped.

**Strongest cell:** The cell on a particular carrier that is considered strongest according to the layer 1 cell search procedure [14][15]. As the details of the layer 1 cell search are implementation dependent, the precise definition of 'strongest cell' is also implementation dependent.

**Suitable Cell:** This is a cell on which an UE may camp. For a UTRA cell, the criteria are defined in subclause 4.3, and for a GSM cell the criteria are defined in [1].

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## 4 General description of Idle mode

### 4.1 Overview

When a UE is switched on, a public land mobile network (PLMN) is selected and the UE searches for a suitable cell of this PLMN to camp on. Criteria for cell selection and cell re-selection between radio access technologies (RATs) described in this document only consider radio criteria. In addition to RAT, the PLMN type may differ as well. In this specification, the term PLMN is used as a generic term covering both GSM MAP and ANSI-41 type of PLMNs. According to the type of PLMN, the way to identify it can be different. If the PLMN type is GSM, the PLMN is identified by 'PLMN identity' and if the PLMN type is ANSI-41, the PLMN is identified by 'SID'

The NAS shall provide a list of equivalent PLMNs, if available, that the AS shall use for cell selection and cell reselection.

The UE searches for a suitable cell of the ~~chosen~~ selected PLMN and chooses that cell to provide available services, and tunes to its control channel. This choosing is known as "camping on the cell". The UE will, if necessary, then register its presence, by means of a NAS registration procedure, in the registration area of the chosen cell and as outcome of a successful Location Registration the selected PLMN becomes the registered PLMN [5].

If the UE finds a more suitable cell, it reselects onto that cell and camps on it. If the new cell is in a different registration area, location registration is performed.

If necessary, the UE shall search for higher priority PLMNs at regular time intervals as described in [9] and search for a suitable cell if another PLMN has been selected by NAS.

NOTE: For RRC connected mode the requirements for the search for higher priority PLMNs are defined in [4].

If the UE loses coverage of the registered PLMN, either a new PLMN is selected automatically (automatic mode), or an indication of which PLMNs are available is given to the user, so that a manual selection can be made (manual mode).

Registration is not performed by UEs only capable of services that need no registration.

The purpose of camping on a cell in idle mode is fourfold:

- a) It enables the UE to receive system information from the PLMN.
- b) When registered and if the UE wishes to establish an RRC connection, it can do this by initially accessing the network on the control channel of the cell on which it is camped.
- c) If the PLMN receives a call for the registered UE, it knows (in most cases) the registration area of the cell in which the UE is camped. It can then send a "paging" message for the UE on control channels of all the cells in the registration area. The UE will then receive the paging message because it is tuned to the control channel of a cell in that registration area and the UE can respond on that control channel.
- d) It enables the UE to receive cell broadcast services.

If the UE is unable to find a suitable cell to camp on, or the USIM is not inserted, or if the location registration failed (except for LR rejected with cause #14 or cause #15, see [5] and [16]), it attempts to camp on a cell irrespective of the PLMN identity, and enters a "limited service" state in which it can only attempt to make emergency calls.

The idle mode tasks can be subdivided into three processes:

- PLMN selection;
- Cell selection and reselection;
- Location registration.

The relationship between these processes is illustrated in Figure 1.

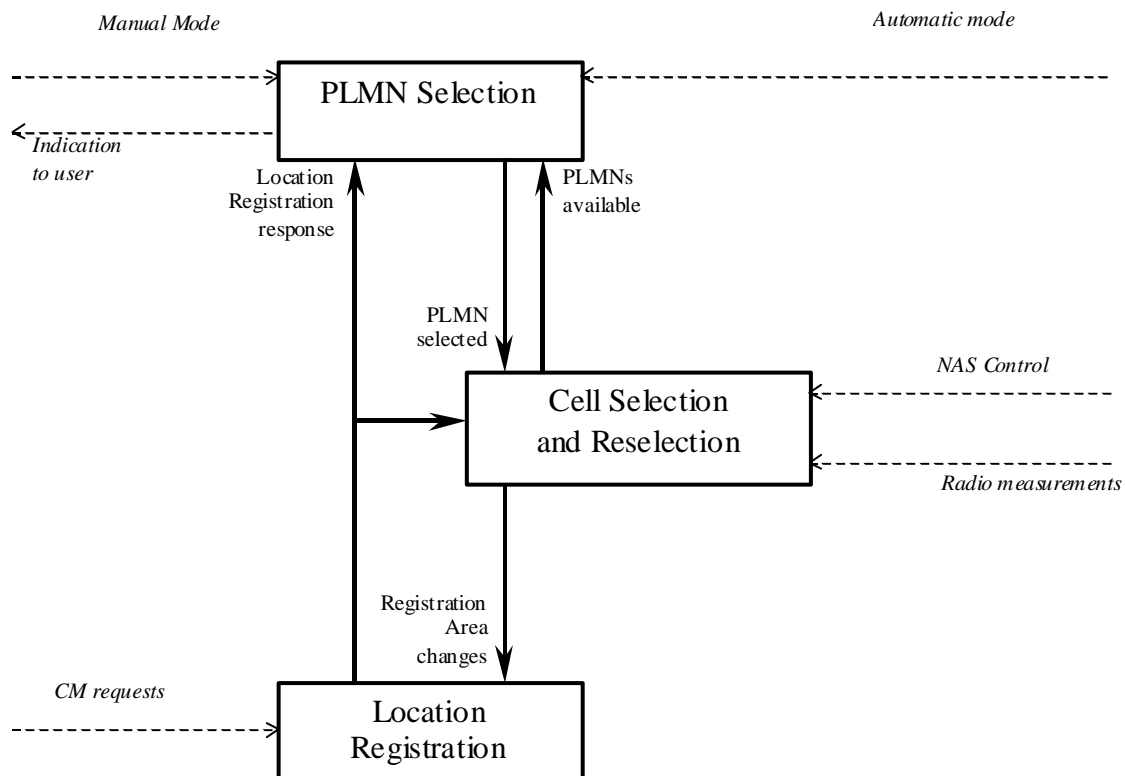


Figure 1: Overall Idle Mode process

## 4.2 Functional division between AS and NAS in Idle mode

Table 1 presents the functional division between UE non-access stratum (NAS) and UE access stratum (AS) in idle mode. The NAS part is specified in [5] and the AS part in the present document. Examples of different idle mode procedures are presented in Clause 10.



Table 1: Functional division between AS and NAS in idle mode

Idle Mode Process	UE Non-Access Stratum	UE Access Stratum
PLMN Selection	<p>Maintain the list of allowed PLMN types. It can be GSM-MAP only, ANSI-41 only or both.</p> <p>Maintain a list of PLMNs in priority order according to [5]. Select a PLMN using automatic or manual mode as specified in [5] and request AS to select a cell belonging to this PLMN. For each PLMN, associated RAT(s) may be set.</p> <p>Evaluate reports of available PLMNs from AS for PLMN selection.</p> <p>Maintain a list of equivalent PLMN identities.</p>	<p>Search for available PLMNs.</p> <p>If associated RAT(s) is (are) set for the PLMN, search in this (these) RAT(s) and other RAT(s) for that PLMN as specified in [5].</p> <p>Perform measurements to support PLMN selection.</p> <p>Synchronise to a broadcast channel to identify found PLMNs.</p> <p>Report available PLMNs with associated PLMN type and RAT to NAS on request from NAS or autonomously.</p> <p>It shall respect allowed PLMN types indications from NAS.</p>
Cell Selection	<p>Control cell selection for example by indicating RAT(s) associated with the selected PLMN to be used initially in the search of a cell in the cell selection. NAS is also maintaining lists of forbidden registration areas.</p>	<p>Perform measurements needed to support cell selection.</p> <p>Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS.</p> <p>Search for a suitable cell <del>belonging to the PLMN requested by NAS</del>. The cells broadcast their 'PLMN identity' (GSM-MAP) or 'SID' in the system information. Respond to NAS whether such cell is found or not.</p> <p>If associated RATs is (are) set for the PLMN, perform the search in this (these) RAT(s) and other RATs for that PLMN as specified in [5].</p> <p>If such a cell is found, the cell is selected to camp on.</p>
Cell Reselection	<p>Control cell reselection by for example, maintaining lists of forbidden registration areas.</p> <p>Maintain a list of equivalent PLMN identities and provide the list to AS.</p> <p>Maintain a list of forbidden LAs and provide the list to AS</p>	<p>Perform measurements needed to support cell reselection.</p> <p>Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS.</p> <p>Change cell if a more suitable cell is found.</p>
Location registration	<p>Register the UE as active after power on.</p> <p>Register the UE's presence in a registration area, for instance regularly or when entering a new registration area.</p> <p>Maintain lists of forbidden LAs.</p> <p>Deregister UE when shutting down.</p>	<p>Report registration area information to NAS.</p>

MBMS	<p>Maintain priority information for various services and participate in service selection.</p> <p>Indicate to AS if an offered session has previously been received.</p>	<p>Maintain a list of TMGIs of activated services.</p> <p>Notify NAS of service availability and request NAS to prioritise in case of service conflicts.</p> <p>Report to NAS when an activated service requires action.</p> <p>Receive and handle the MCCH and MTCH, and, if applicable, the MSCH and MICH.</p>
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### 4.3 Service type in Idle and Connected Mode

This clause defines the level of service that may be provided by the network to a UE in Idle mode and Connected Mode.

The action of camping on a cell is necessary to get access to some services. Three levels of services are defined for UE:

- Limited service (emergency calls on an acceptable cell)
- Normal service (for public use on a suitable cell)
- Operator service (for operators only on a reserved cell)

Furthermore, the cells are categorised according to which services they offer:

#### acceptable cell:

An "acceptable cell" is a cell on which the UE may camp to obtain limited service (originate emergency calls). Such a cell shall fulfil the following requirements, which is the minimum set of requirements to initiate an emergency call in a UTRAN network:

- The cell is not barred, see subclause 5.3.1.1;
- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2;

#### suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell shall be part of either:
  - ~~is part of~~ the selected PLMN, or;
  - the registered PLMN, or;
  - a PLMN of the Equivalent PLMN list
  - ~~, of a PLMN considered as equivalent by the UE~~ according to the latest information provided by the NAS.
- The cell is not barred, see subclause 5.3.1.1;
- The cell is part of at least one LA that is not part of the list of "forbidden LAs for roaming" [9], which belongs to a PLMN that fulfills the first bullet above;
- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

If the IE "Multiple PLMN List" [4] is broadcast in the cell, the cell is considered to be part of all LAs with LAIs constructed from the PLMN identities in the "Multiple PLMN List" and the LAC broadcast in the cell.

#### barred cell:

A cell is barred if it is so indicated in the system information [4].

reserved cell:

A cell is reserved if it is so indicated in system information [4].

Exceptions to these definitions are applicable for UEs during emergency calls.

If a UE has an ongoing emergency call, all acceptable cells of that PLMN are treated as suitable for cell reselection for the duration of the emergency call.

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## 5 Process and procedure descriptions

### 5.1 PLMN selection

#### 5.1.1 General

In the UE, the AS shall report available PLMNs to the NAS on request from the NAS or autonomously.

UE shall maintain a list of allowed PLMN types. The allowed PLMN type can be GSM-MAP only, ANSI-41 only or both. During PLMN selection, based on the list of allowed PLMN types and a list of PLMN identities in priority order, the particular PLMN may be selected either automatically or manually. Each PLMN in the list of PLMN identities can be identified by either 'PLMN identity' (GSM-MAP) or 'SID'. In the system information on the broadcast channel, the UE can receive a 'PLMN identity' (GSM-MAP) or a 'SID' or a 'PLMN identity' (GSM-MAP) and a 'SID', in a given cell. For a given cell, the UE might receive several 'PLMN identities' from the system information on the broadcast channel. The result of the PLMN selection is an identifier of the ~~chosen~~ selected PLMN, the choice being based on the allowed PLMN types, UE capability or other factors. This identifier is one of either 'PLMN identity' for GSM-MAP type of PLMNs or 'SID' for ANSI-41 type of PLMNs.

In case that the list of allowed PLMN types includes GSM-MAP, the non-access part of the PLMN selection process is specified in [5]. In the case that list of allowed PLMN types includes ANSI-41, the non-access stratum part of the PLMN selection is specified in TIA/EIA/IS-2000.5 and TIA/EIA/IS-707.

#### 5.2.2.5 Camped on any cell State overview

In this state the UE obtains limited service and shall behave as specified in subclause 5.2.9. The UE shall regularly attempt to find a suitable cell ~~of the selected PLMN~~, trying all RATs that are supported by the UE. If a suitable cell is found, this causes an exit to number 2 in figure 2.

NOTE: The 'PLMN selection' process may select a new PLMN at any time in idle mode, which in Figure 2 causes an exit to number 1.

### 5.2.3 Cell Selection Process

#### 5.2.3.1 UTRA case

##### 5.2.3.1.1 Description

The UE shall use one of the following two search procedures:

a) Initial Cell Selection

This procedure requires no prior knowledge of which RF channels are UTRA carriers. The UE shall scan all RF channels in the UTRA bands according to its capabilities to find a suitable cell ~~of the selected PLMN~~. On each carrier, the UE need only search for the strongest cell. Once a suitable cell is found this cell shall be selected.

b) Stored Information Cell Selection

This procedure requires stored information of carrier frequencies and optionally also information on cell parameters, e.g. scrambling codes, from previously received measurement control information elements. Once the UE has found a suitable cell ~~for the selected PLMN~~ the UE shall select it. If no suitable cell ~~of the selected PLMN~~ is found the Initial cell selection procedure shall be started.

### 5.2.3.1.2 Criteria

[This subclause will need material on the MBMS offset, expected as part of the FLC changes.]

The cell selection criterion  $S$  is fulfilled when:

for FDD cells:	$S_{rxlev} > 0$ AND $S_{qual} > 0$
for TDD cells:	$S_{rxlev} > 0$

Where:

$S_{qual} = Q_{qualmeas} - Q_{qualmin}$
$S_{rxlev} = Q_{rxlevmeas} - Q_{rxlevmin} - P_{compensation}$

Squal	Cell Selection quality value (dB) Applicable only for FDD cells.
Srxlev	Cell Selection RX level value (dB)
$Q_{qualmeas}$	Measured cell quality value. The quality of the received signal expressed in CPICH $E_c/N_0$ (dB) for FDD cells. CPICH $E_c/N_0$ shall be averaged as specified in [10]. Applicable only for FDD cells.
$Q_{rxlevmeas}$	Measured cell RX level value. This is received signal, CPICH RSCP for FDD cells (dBm) and P-CCPCH RSCP for TDD cells (dBm).
Qqualmin	Minimum required quality level in the cell (dB). Applicable only for FDD cells.
Qrxlevmin	Minimum required RX level in the cell (dBm)
Pcompensation	$\max(UE\_TXPWR\_MAX\_RACH - P\_MAX, 0)$ (dB)
UE_TXPWR_MAX_RACH	Maximum TX power level an UE may use when accessing the cell on RACH (read in system information) (dBm)
P_MAX	Maximum RF output power of the UE (dBm)

### 5.2.3.2 GSM case

The cell selection criteria and procedures in GSM are specified in [1].

## 5.2.8 Any Cell Selection state

In this state, the UE shall attempt to find an acceptable cell of an any PLMN to camp on, trying all RATs that are supported by the UE and searching first for a high quality cell, as defined in subclause 5.1.2.2.

The UE, which is not camped on any cell, shall stay in this state until an acceptable cell is found.

## 5.2.9 Camped on Any Cell State

### 5.2.9.1 UTRA case

In this state, the UE shall perform the following tasks:

- select and monitor the indicated PICH and PCH of the cell as specified in clause 8;

- monitor relevant System Information; This is specified in [4];
- perform necessary measurements for the cell reselection evaluation procedure;
- Execute the cell reselection evaluation process on the following occasions/triggers:
  - 1) UE internal triggers, so as to meet performance as specified in [10] and [11];
  - 2) When information on the BCCH used for the cell reselection evaluation procedure has been modified;
- regularly attempt to find a suitable cell ~~of the selected PLMN~~ trying all RATs that are supported by the UE. If a suitable cell is found, this causes an exit to number 2 in Figure 2.

In this state the UE is not permitted to receive any MBMS services.

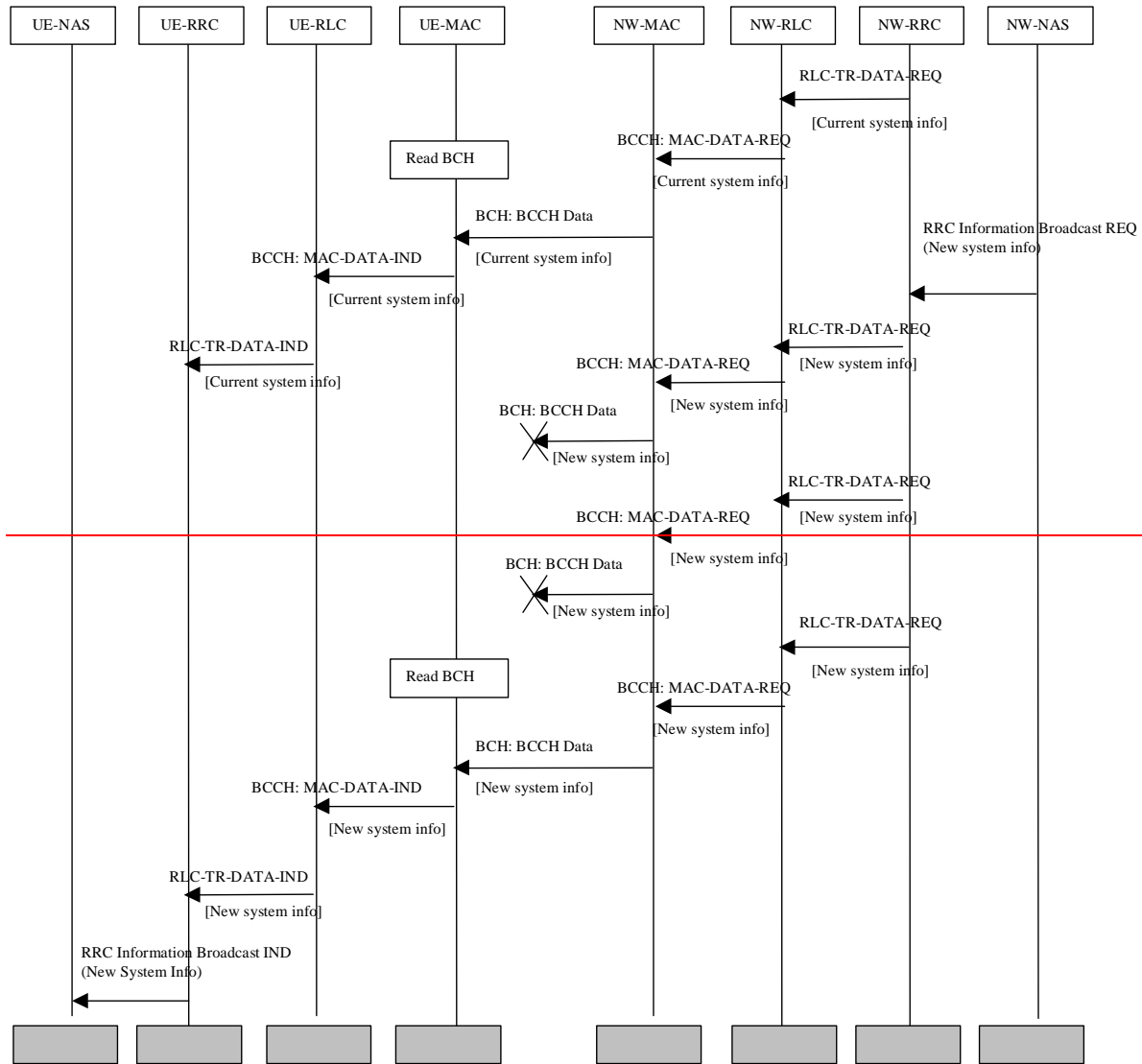
### 5.2.9.2 GSM case

The camped on any cell state in GSM is specified in [1].

# 10 ~~Examples of Procedures~~ Void

## 10.1 ~~NAS initiated change of system information~~

The sequence in Figure 5 shows the change of broadcast system information initiated from the NAS.



**Figure 5: Example sequence, NAS initiated change of broadcast system info**

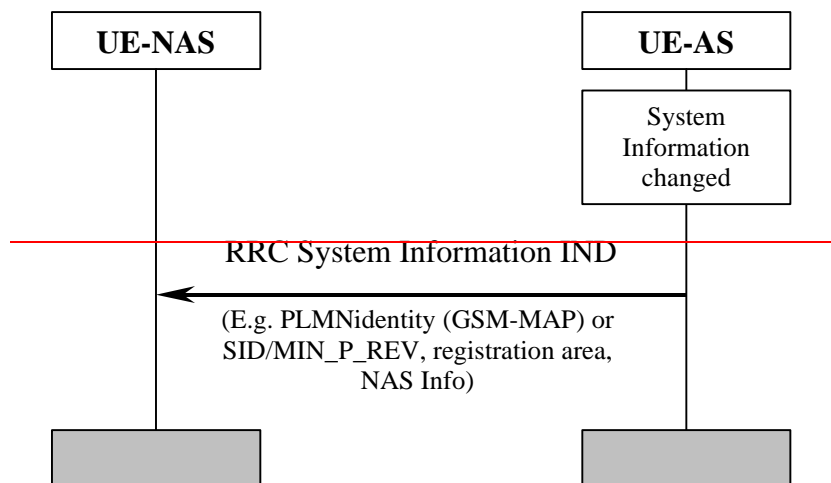
A NAS entity in the network issues a request for change of the broadcast system information, by issuing a RRC Information Broadcast REQ primitive over the General Control (GC) SAP.

The change in system information in this example is such that it is not necessary for the UEs to be forced to receive BCCH immediately after the change. All UEs will eventually read the new system information either at e.g. cell reselection or at UE state change.

When the UE reads system information on BCCH and the RRC layer finds out that the non-access part of the information has been changed, an RRC Information Broadcast IND primitive is issued to the NAS entity in the UE over the General Control (GC) SAP.

**NOTE:**—The network may force the UEs in a paging group to read system information by sending a page request message, but this is not shown in the example above.

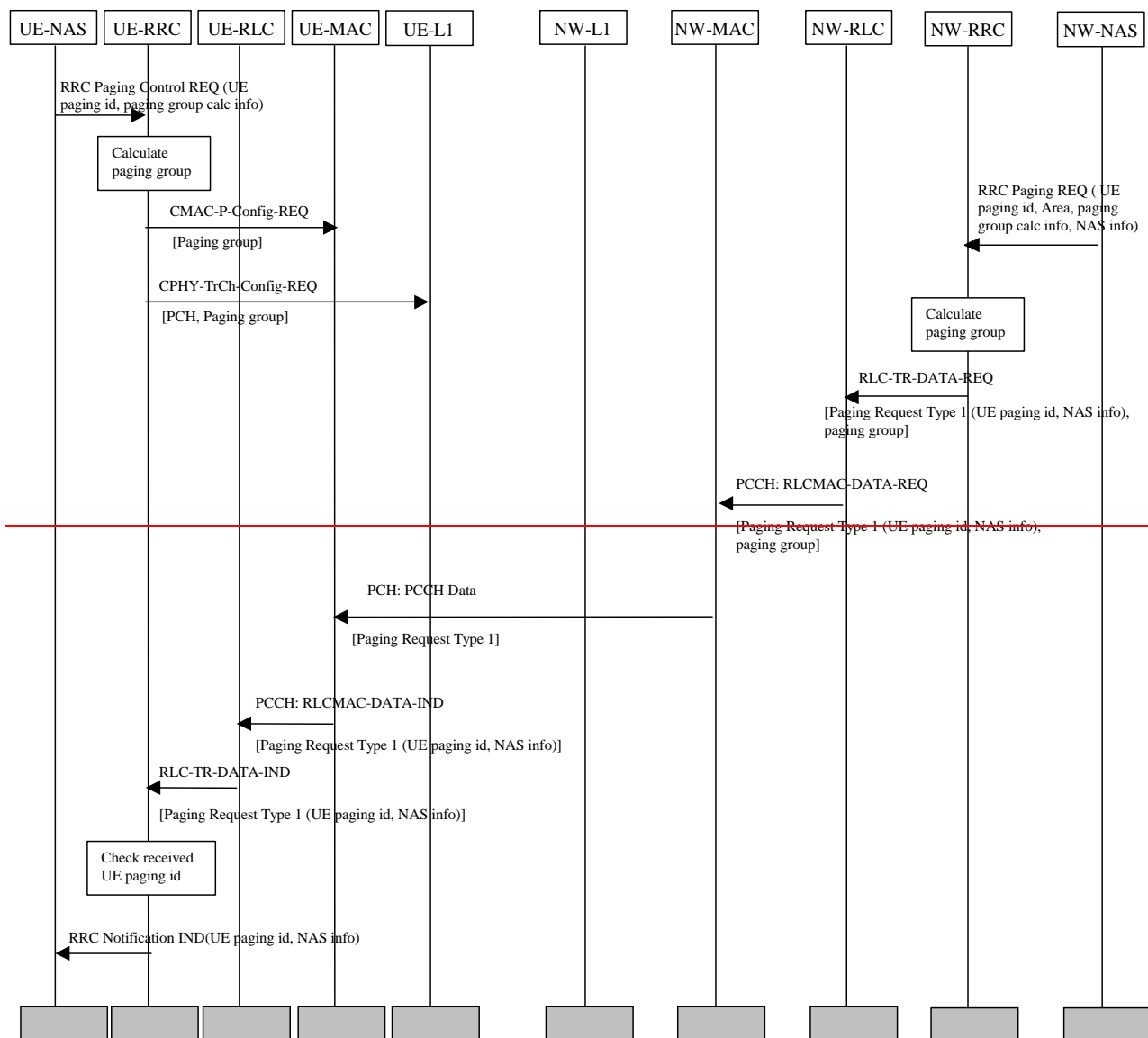
## 10.2 System Information Update to NAS



**Figure 6: System Information Update to NAS**

AS sends system information to NAS when a change of system information is detected in the cell currently camped on. This happens for instance when a new cell is selected due to cell reselection. The information sent can include PLMN identity (GSM-MAP or SID), registration area and NAS information.

### 10.3 ~~CN originated paging in idle mode~~



**Figure 7: Example sequence of CN initiated paging request in idle mode**

Figure 7 illustrates a CN originated paging request when the UE is in idle mode.

In the UE, a NAS entity issues the primitive RRC Paging Control REQ, which tells RRC to listen to paging and notifications addressed to a given UE paging identity and on a paging group which can be calculated using information given from NAS.

**NOTE:**—The paging group calculation info can e.g. be the IMSI of the UE.

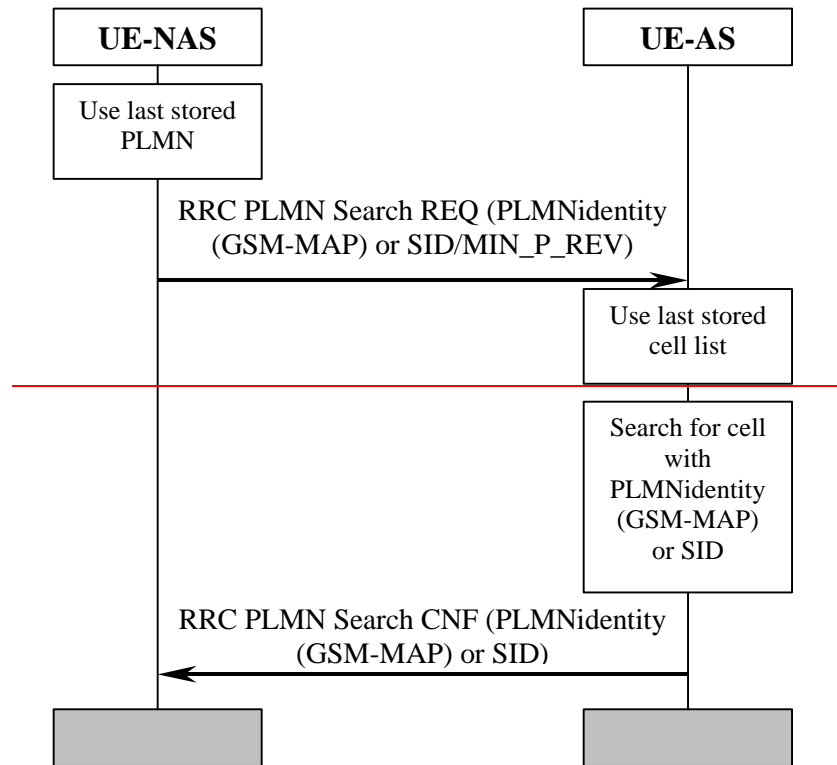
A NAS entity on the network side requests paging of an UE using the RRC Paging REQ primitive over the Nt SAP. The primitive contains a UE paging identity, an area where the page request is to be broadcast, information for calculation of the paging group and NAS information to be transparently transmitted to the UE by the paging request.

The RRC layer calculates the paging group, and formats a Paging Request Type 1 message containing the UE paging identity and the NAS information. The RRC layer then requests MAC to transmit the message on a specific PCH on the selected paging group. The PCH to be used for transmission of the paging message is selected based on the IMSI of the UE.

In the UE, the RRC layer continuously monitors the paging group, compares the UE paging identities in received paging request messages with its own identities. A match occurs, and in this case the UE paging identity and the NAS information is forwarded to the NAS entity of the UE.



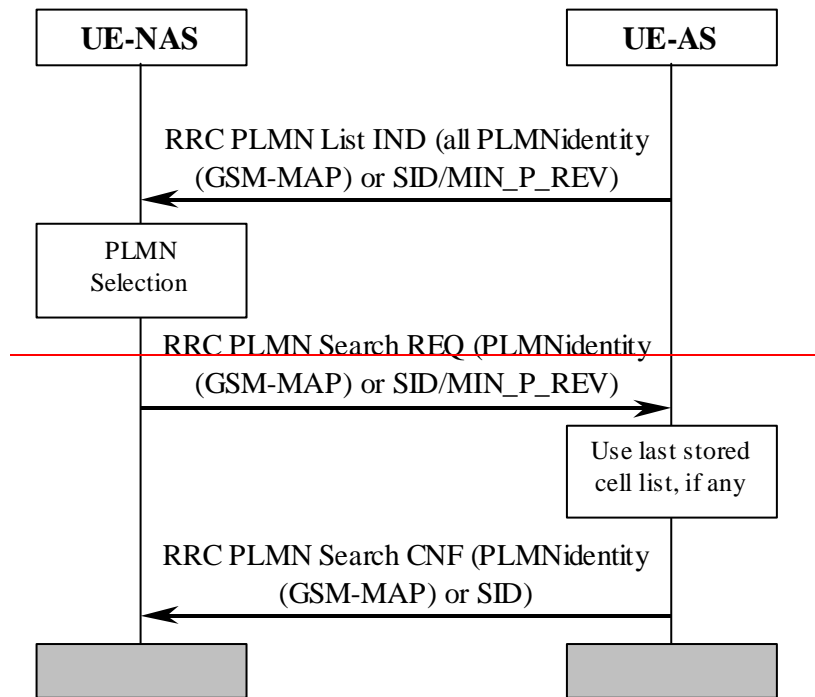
## 10.4 ~~PLMN Selection, automatic mode, normal case~~



**Figure 8: ~~PLMN Selection, automatic mode, normal case~~**

At power on, NAS selects the PLMN according to the priority defined in [5]. The AS is requested to find a cell belonging to that PLMN. When searching for the requested PLMN and in order to speed up the search, AS may use a list of cell information stored prior to previous power off. When a suitable cell belonging to the requested PLMN is found, that cell is selected and NAS is notified that the PLMN was found.

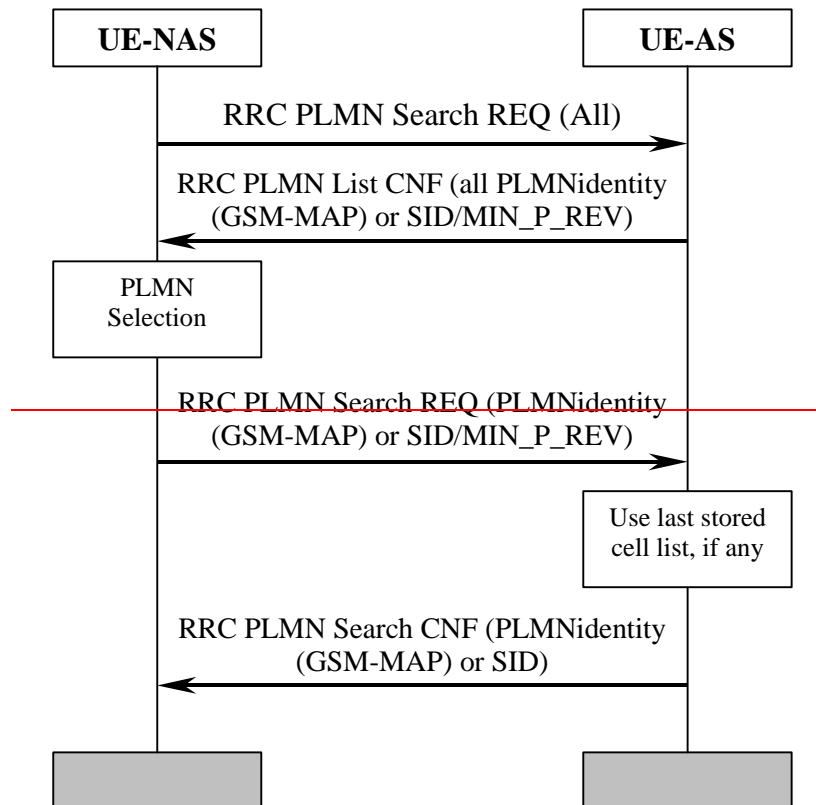
## 10.5 ~~PLMN Selection, automatic mode~~



**Figure 9: ~~PLMN Selection, automatic mode~~**

~~Triggered by, for instance, a timer in NAS, AS is requested to send a list to NAS with all PLMNs currently available. The list includes the identities of available PLMNs. Assuming that a PLMN with higher priority is found, NAS requests AS to select a suitable cell belonging to the PLMN with highest priority. When searching for the requested PLMN and in order to speed up the search, AS may use a list of cell information previously stored. When a suitable cell belonging to the requested PLMN is found, that cell is selected and NAS is notified that the PLMN was found.~~

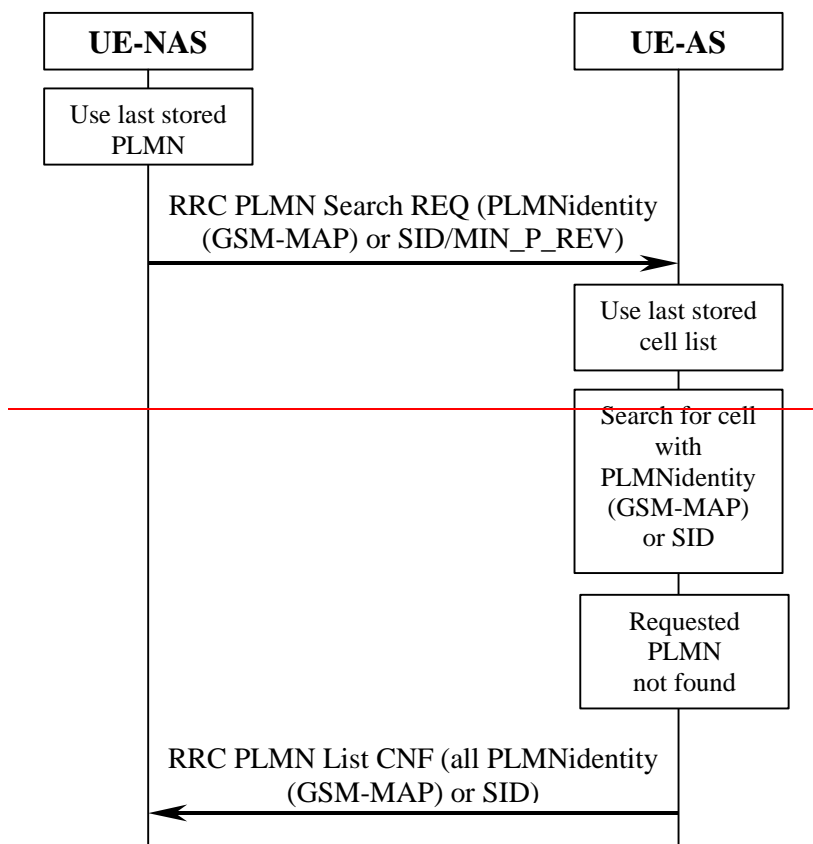
## 10.6 ~~PLMN Selection, manual mode~~



**Figure 10: PLMN Selection, manual mode**

NAS requests AS to report all PLMNs currently available, for instance as a response to a user request. AS sends a list to NAS with all PLMNs currently available. The list includes the identities of available PLMNs. Assuming that a PLMN with higher priority is selected by for instance the user, NAS requests AS to select a suitable cell belonging to the PLMN with highest priority. When searching for the requested PLMN and in order to speed up the search, AS may use a list of cell information previously stored. When a suitable cell belonging to the requested PLMN is found, that cell is selected and NAS is notified that the PLMN was found.

### ~~10.7 PLMN Selection, automatic mode, selected PLMN not found~~

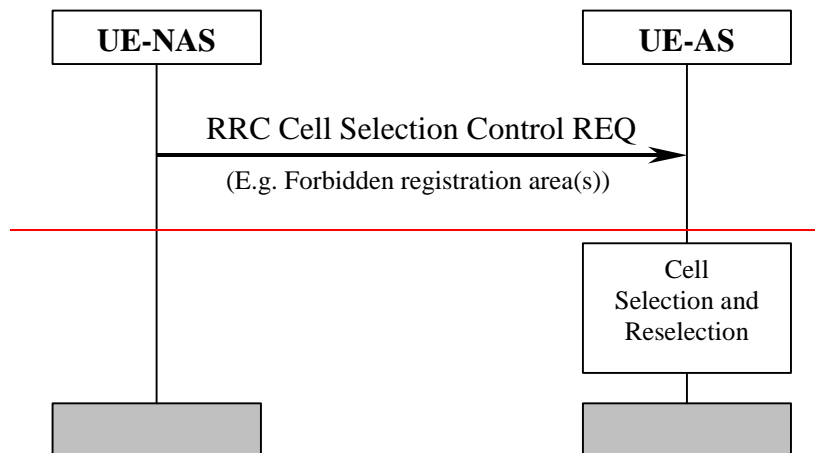


**Figure 11: PLMN Selection, automatic mode, selected PLMN not found**

At power on, NAS selects the PLMN according to the priority defined in [5]. The AS is requested to find a suitable cell belonging to that PLMN. When searching for the requested PLMN and in order to speed up the search, AS may use a list of cell information stored prior to previous power off. If no suitable cell is found belonging to the requested PLMN, a list of available PLMNs is sent to NAS.

## ~~10.8 NAS Controlled Cell Selection~~

### ~~10.8.1 Execution in AS~~

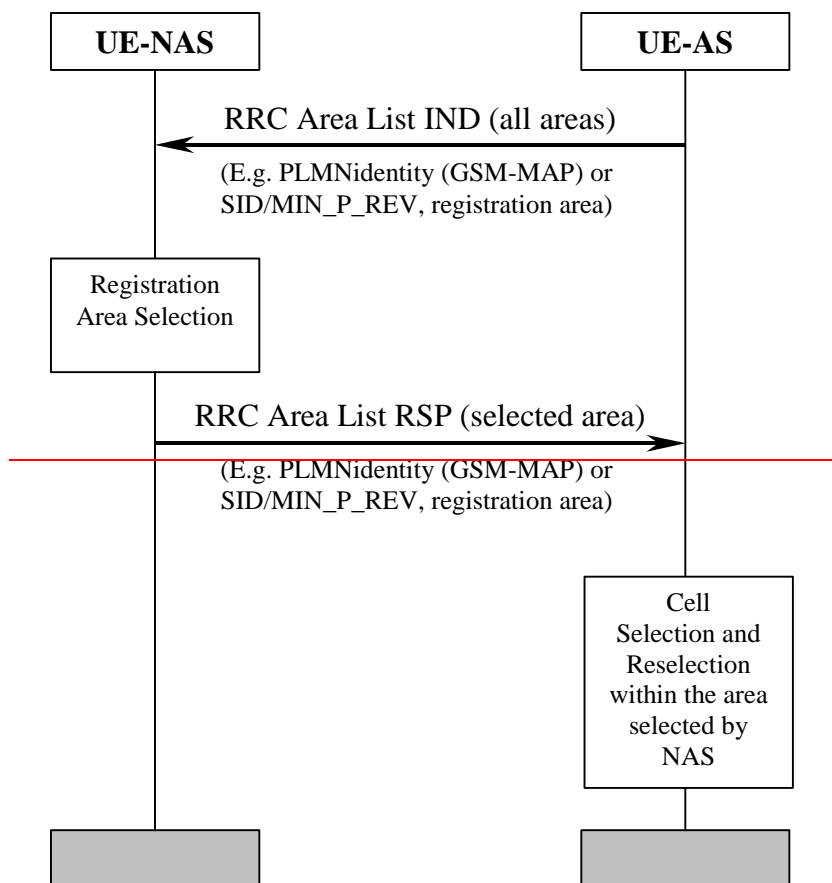


**Figure 12: NAS Controlled Cell Selection, execution in AS**

NAS may influence the cell selection and reselection by sending control information to AS. This information can include, for example, lists of forbidden registration areas. The control information is used by AS in cell selection and reselection:

- Cells belonging to a forbidden registration area will only be selected if no better cell is found. At this point, the services provided the UE might be limited.

10.8.2 Execution in NAS



**Figure 13: NAS Controlled Cell Selection, execution in NAS**

As an alternative to the example in subclause 10.8.1, AS sends cell selection information to NAS. This information can include PLMN identity (GSM-MAP) or SID and registration area. The information contains the full set of available registration areas. The information is typically sent when there is a change of available areas, for instance when a neighbour cell belonging to a new registration area.

AS performs cell selection and reselection for the selected registration area without interaction with NAS. However, before reselecting a cell in another registration area, AS shall check with NAS.



## CHANGE REQUEST

⌘ **25.331 CR 2527** ⌘ rev      ⌘ Current version: **6.4.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Corrections to "selected PLMN" in access stratum		
<b>Source:</b>	⌘ RAN WG2		
<b>Work item code:</b>	⌘ TEI-6, NTShar-UTRANEnh	<b>Date:</b>	⌘ Feb 2005
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-6
	Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		Use <u>one</u> of the following releases: Ph2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6) Rel-7 (Release 7)

<b>Reason for change:</b>	⌘ During RAN2#44, erroneous usage of the term "selected PLMN" was detected in AS specs 25.331 and 25.304.
<b>Summary of change:</b>	⌘ The following proposals are included in this change request: <ol style="list-style-type: none"> <li>1. Removal of the SELECTED_PLMN variable</li> <li>2. Correction of the SIB scope rules, incorporating changes required due to incorrect usage of the term "selected PLMN", and the introduction of network sharing.</li> <li>3. Corrections of handling of SIB18, incorporating changes required due to incorrect usage of the term "selected PLMN", and the introduction of network sharing.</li> <li>4. Removal of the case in which the UE AS is setting the "selected PLMN";</li> <li>5. Clarification of the cases in which UE AS releases an existing RRC connection due to UE NAS selecting a new PLMN.</li> </ol> <p style="margin-left: 20px;">See R2-050337 for more details.</p> <p style="margin-left: 20px;"><b>Implementation by a R99/Rel-4/Rel-5 UE of those parts of this CR that are not related to network sharing, will not cause backwards compatibility issues.</b></p>
<b>Consequences if not approved:</b>	⌘ Identified unclarities/errors remain in the specification.

**Clauses affected:** ⌘ 7.1; 7.2.2.1; 7.2.2.2; 8.1.1.3; 8.1.1.5; 8.1.1.6.1; 8.1.1.6.13; 8.1.1.6.18; 8.1.3.9;



		8.5.1; 8.5.2; 8.5.14; 8.5.14a; 8.5.24; 8.6.1.2; 10.3.7.53a; 13.4.21; 13.4.32;										
<b>Other specs affected:</b>		<table border="1"><tr><td>Y</td><td>N</td></tr><tr><td>X</td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	Y	N	X						Other core specifications	⌘ 25.304 CR125rev1.
	Y	N										
	X											
		Test specifications										
		O&M Specifications										
<b>Other comments:</b>	⌘											

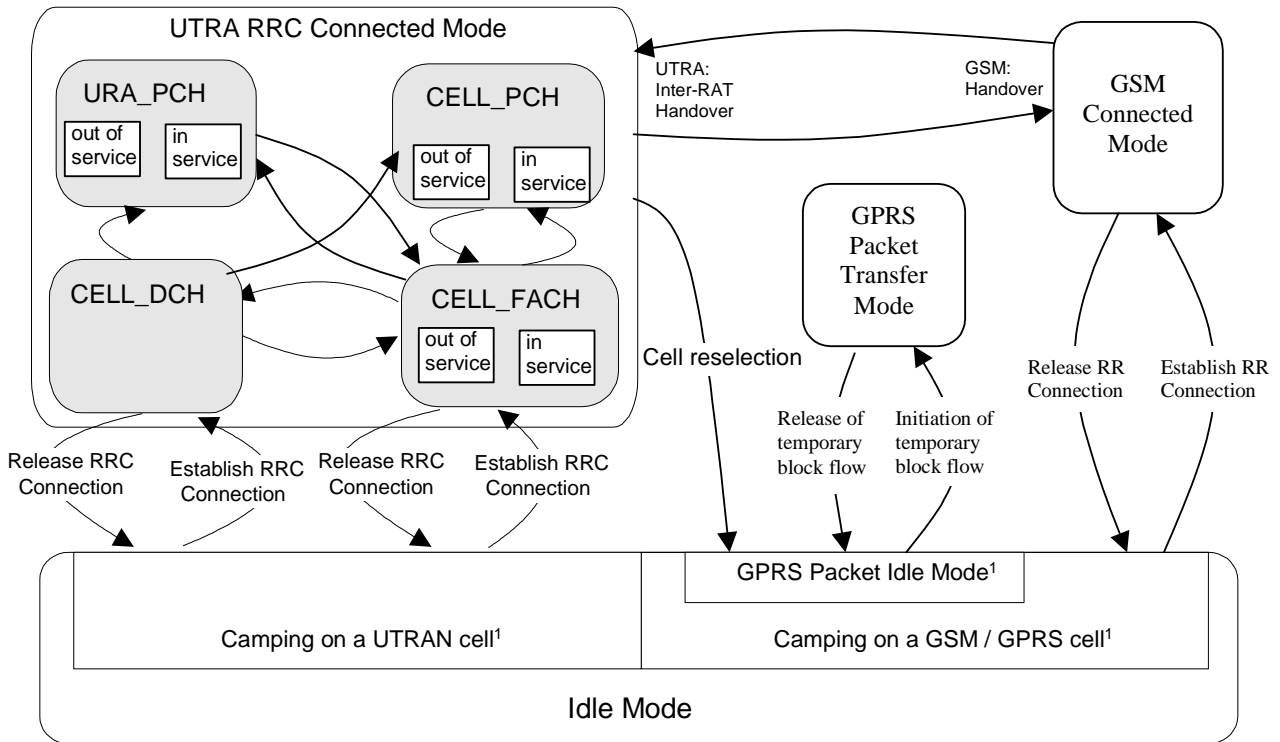
**How to create CRs using this form:**

Comprehensive information and tips about how to create CRs can be found at <http://www.3gpp.org/specs/CR.htm>. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

## 7.1 Overview of RRC States and State Transitions including GSM

Figure 7.1-1 shows the RRC states in UTRA RRC Connected Mode, including transitions between UTRA RRC connected mode and GSM connected mode for CS domain services, and between UTRA RRC connected mode and GSM/GPRS packet modes for PS domain services. It also shows the transitions between Idle Mode and UTRA RRC Connected Mode and furthermore the transitions within UTRA RRC connected mode.



NOTE: <sup>1</sup>: The indicated division within Idle Mode is only included for clarification and shall not be interpreted as states.

**Figure 7.1-1: RRC States and State Transitions including GSM**

The RRC connection is defined as a point-to-point bi-directional connection between RRC peer entities in the UE and the UTRAN characterised by the allocation of a U-RNTI. A UE has either zero or one RRC connection.

[If NAS informs AS about a new selected PLMN, registered PLMN or equivalent PLMN list while being in connected mode, the UE shall perform the actions according to subclause 8.5.24.](#)

NOTE: The state transitions are specified in clause 8.

### 7.2.2.1 URA\_PCH or CELL\_PCH state

In the URA\_PCH or CELL\_PCH state the UE shall perform the following actions:

NOTE: Neither DCCH nor DTCH are available in these states.

- 1> if the UE is "in service area":
  - 2> maintain up-to-date system information as broadcast by the serving cell as specified in the subclause 8.1.1;
  - 2> perform cell reselection process as specified in [4];
  - 2> perform a periodic search for higher priority PLMNs as specified in [25];

NOTE: If the DRX cycle length is 80ms, then a search for higher priority PLMNs may not identify all the available PLMNs due to the paging occasion on the current serving cell coinciding with the MIB of the cell of interest.

- 2> monitor the paging occasions and PICH monitoring occasions determined according to subclauses 8.6.3.1a and 8.6.3.2 and receive paging information on the PCH mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;
  - 2> act on RRC messages received on PCCH and BCCH;
  - 2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;
  - 2> maintain up-to-date BMC data if it supports Cell Broadcast Service (CBS) as specified in [37];
  - 2> run timer T305 for periodical URA update if the UE is in URA\_PCH or for periodical cell update if the UE is in CELL\_PCH.
- 1> if the UE is "out of service area":
- 2> perform cell selection process as specified in [4];
  - 2> run timer T316;
  - 2> run timer T305;
  - 2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE shall after a minimum of TimerOutOfService time (default value 30 s) of being "out of service area":
    - 3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. ~~If the NAS indicates the selection of a new PLMN the UE shall store information for the new PLMN within the variable SELECTED\_PLMN and perform actions according to subclause 8.5.24;~~
    - 3> if an acceptable cell is found then the UE shall camp on that cell to obtain limited service as defined in [4] and, perform actions according to subclause 8.5.24;
    - 3> else if no acceptable cell is found, the UE shall continue looking for an acceptable cell as defined in [4].

### 7.2.2.2 CELL\_FACH state

In the CELL\_FACH state the UE shall perform the following actions:

NOTE: DCCH and, if configured, DTCH are available in this state.

- 1> if the UE is "in service area":
- 2> maintain up-to-date system information as broadcast by the serving cell as specified in subclause 8.1.1;
  - 2> perform cell reselection process as specified in [4];
  - 2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;
  - 2> run timer T305 (periodical cell update);
  - 2> select and configure the RB multiplexing options applicable for the transport channels to be used in this RRC state;
  - 2> listen to all FACH transport channels mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;
  - 2> act on RRC messages received on BCCH, CCCH and DCCH;
  - 2> act on RRC messages received on, if available, SHCCH (TDD only).
- 1> if the UE is "out of service area":

- 2> perform cell selection process as specified in [4];
- 2> run timers T305 (periodical cell update), and T317 (cell update when re-entering "in service") or T307 (transition to Idle mode), if started;
- 2> run timers T314 and/or T315, if started;
- 2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE shall after a minimum of TimerOutOfService time (default value 30 seconds) of being "out of service area":
  - 3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. ~~If the NAS indicates the selection of a new PLMN the UE shall store information for the new PLMN within the variable SELECTED\_PLMN and perform actions according to subclause 8.5.24;~~
  - 3> if an acceptable cell is found then the UE shall camp on that cell to obtain limited service as defined in [4] and perform actions according to subclause 8.5.24;
  - 3> else if no acceptable cell is found, the UE shall continue looking for an acceptable cell as defined in [4].

### 8.1.1.3 Reception of SYSTEM INFORMATION messages by the UE

The UE shall read SYSTEM INFORMATION messages broadcast on a BCH transport channel in idle mode and in the connected mode in states CELL\_FACH, CELL\_PCH, URA\_PCH and CELL\_DCH (TDD only). In addition, UEs in FDD mode which support simultaneous reception of one SCCPCH and one DPCH shall read system information on a FACH transport channel when in CELL\_DCH state.

In idle mode and connected mode different combinations of system information blocks are valid. The UE shall acquire the system information blocks that are needed according to table 8.1.1.

The UE may store system information blocks with *cell*, *PLMN* or *Equivalent PLMN* area scope (including their value tag if applicable) for different cells and different PLMNs, to be used if the UE returns to these cells.

The UE shall consider all stored system information blocks as invalid after it has been switched off. Some information obtained from system information may be stored by the UE or in the USIM for use in a stored information cell selection.

When selecting a new cell ~~within the currently used PLMN~~, the UE shall consider all current system information blocks with area scope cell to be invalid. If the UE has stored valid system information blocks for the newly selected cell, the UE may set those as current system information blocks.

After selecting a new cell and this cell broadcasts an IE "PLMN Identity" in the MIB which is different from the IE "PLMN Identity" broadcast in the MIB in the previously selected cell, the UE shall consider all current system information blocks with area scope ~~cell and PLMN~~ to be invalid. If the UE has previously stored valid system information blocks for the selected cell of the new PLMN, the UE may set those as current system information blocks.

~~Upon selection of a new PLMN the UE shall store all information elements specified within variable SELECTED\_PLMN for the new PLMN within this variable.~~

When NAS informs AS about a selected PLMN ~~After selecting a new selected PLMN which is not indicated by higher layers to be equivalent to the identity of the previously selected PLMN~~, the UE shall consider all stored system information blocks with area scope *Equivalent PLMN* to be invalid.

### 8.1.1.5 Actions upon reception of the Master Information Block and Scheduling Block(s)

When selecting a new cell, the UE shall read the master information block. The UE may use the pre-defined scheduling information to locate the master information block in the cell.

Upon reception of the master information block, the UE shall:

- 1> if the IE "Multiple PLMN List" is not present in the Master Information Block:
- 2> consider the IE "PLMN identity" in the Master Information Block as the PLMN identity of the cell.

- 1> else:
  - 2> consider the PLMN identities in the IE "Multiple PLMN List" as the PLMN identities of the cell;
  - 2> when reading the "Multiple PLMN List", read all the PLMN identities in the list as follows:
    - 3> if the IE "MIB PLMN Identity" is set to TRUE:
      - 4> read the "PLMN identity" IE in the MIB and consider it as a part of the "Multiple PLMN List".
    - 3> if the IE "MIB PLMN Identity" is set to FALSE:
      - 4> not consider the "PLMN identity" IE in the MIB as a part of the "Multiple PLMN List";
      - 4> not consider the IE "PLMN identity" in the MIB as a PLMN identity of the cell;
      - 4> not forward the PLMN in the IE "PLMN identity" of the MIB to upper layers.
    - 3> if the MCC is not present when reading a IE "PLMN identity with Optional MCC" in the IE "Multiple PLMN List":
      - 4> set the MCC of this PLMN identity equal to the MCC of the closest preceding "PLMN identity with Optional MCC" in the "Multiple PLMN List" that includes an MCC;
      - 4> or, if no such "PLMN identity with Optional MCC" exists, the UE shall set the MCC of this PLMN identity to the MCC of the "PLMN identity" IE in the Master Information Block.
  - 1> if the UE is operating in "ANSI-41 mode" ~~the "PLMN type" in the variable SELECTED\_PLMN has the value "ANSI-41"~~ and the IE "PLMN Type" has the value "ANSI-41" or "GSM-MAP and ANSI-41":
    - 2> store the ANSI-41 Information elements contained in the master information block and perform initial process for ANSI-41.
  - 1> compare the value tag in the master information block with the value tag stored for this cell and this PLMN in the variable VALUE\_TAG;
    - 1> if the value tags differ, or if no IEs for the master information block are stored:
      - 2> store the value tag into the variable VALUE\_TAG for the master information block;
      - 2> read and store scheduling information included in the master information block.
    - 1> if the value tags are the same the UE may use stored system information blocks and scheduling blocks using value tag that were stored for this cell and this PLMN as valid system information.

For all system information blocks or scheduling blocks that are supported by the UE referenced in the master information block or the scheduling blocks, the UE shall perform the following actions:

- 1> for all system information blocks with area scope "PLMN" or "Equivalent PLMN" that use value tags:
  - 2> compare the value tag read in scheduling information for that system information block with the value stored within the variable VALUE\_TAG for that system information block;
  - 2> if the value tags differ, or if no IEs for the corresponding system information block are stored:
    - 3> store the value tag read in scheduling information for that system information block into the variable VALUE\_TAG;
    - 3> read and store the IEs of that system information block.
  - 2> if the value tags are the same the UE may use stored system information blocks using value tag that were stored in this PLMN as valid system information.
- 1> for all system information blocks or scheduling blocks with area scope cell that use value tags:

- 2> compare the value tag read in scheduling information for that system information block or scheduling block with the value stored within the variable VALUE\_TAG for that system information block or scheduling block;
- 2> if the value tags differ, or if no IEs for the corresponding system information block or scheduling block are stored:
  - 3> store the value tag read in scheduling information for that system information block or scheduling block into the variable VALUE\_TAG;
  - 3> read and store the IEs of that system information block or scheduling block.
- 2> if the value tags are the same the UE may use stored system information blocks using value tags that were stored for this cell and this PLMN as valid system information.
- 1> for system information blocks which may have multiple occurrences:
  - 2> compare the value tag and the configuration or multiple occurrence identity for the occurrence of the system information blocks read in scheduling information with the value tag and configuration or multiple occurrence identity stored within the variable VALUE\_TAG:
    - 3> if the value tags differ, or if no IEs from the occurrence with that configuration or multiple occurrence identity of the system information block are stored:
      - 4> store the value tag read in scheduling information for that system information block and the occurrence with that configuration or multiple occurrence identity into the variable VALUE\_TAG;
      - 4> read and store the IEs of that system information block.
    - 3> if the value tags and the configuration or multiple occurrence identity are identical to those stored, the UE may use stored occurrences of system information blocks that were stored for this cell and this PLMN as valid system information.

For system information blocks, not supported by the UE, but referenced either in the master information block or in the scheduling blocks, the UE may:

- 1> skip reading this system information block;
- 1> skip monitoring changes to this system information block.

If the UE:

- 1> receives a scheduling block at a position different from its position according to the scheduling information for the scheduling block; or
- 1> receives a scheduling block for which scheduling information has not been received:

the UE may:

- 1> store the content of the scheduling block with a value tag set to the value NULL; and
- 1> consider the content of the scheduling block as valid until it receives the same type of scheduling block in a position according to its scheduling information or at most for 6 hours after reception.

If the UE does not find a scheduling block in a position where it should be according to its scheduling information, but a transport block with correct CRC was found at that position, the UE shall:

- 1> read the scheduling information for this scheduling block.

If the UE does not find the master information block in a position fulfilling:

$$\text{SFN mod } 32 = 0$$

but a transport block with correct CRC was found at that position), the UE shall:

- 1> consider the master information block as not found; and

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

NOTE: This permits a different repetition for the MIB in later versions for FDD. In TDD it allows for a variable SIB\_REP in this and future releases.

If system information block type 1 is not scheduled on BCH, and system information block type 13 is not scheduled on BCH, the UE shall:

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

If the UE only supports GSM-MAP but finds a cell that broadcasts System Information Block type 13 but not System Information Block type 1, the UE shall:

1> consider the cell barred.

If:

- system information block type 1 is not scheduled on BCH; and
- the UE is operating in "GSM-MAP mode" ~~"PLMN Type" in the variable SELECTED\_PLMN has the value "GSM-MAP";~~ and
- the IE "PLMN type" in the Master Information Block has the value "GSM-MAP" or "GSM-MAP and ANSI-41":

the UE shall:

1> indicate to upper layers that no CN system information is available.

If in idle mode and System Information Block type 3 is not scheduled on BCH, the UE shall:

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

If in connected mode and System Information Block type 3 is not scheduled on BCH, and System Information Block type 4 is not scheduled on BCH, the UE shall:

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

If in idle mode and neither System Information Block type 5 nor type 5bis is scheduled on BCH, or System Information Block type 5 or type 5bis is scheduled but IE "AICH info" (FDD) or IE "PICH info" is not present, the UE shall:

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

If in connected mode and neither System Information Block type 5 nor type 5bis is scheduled on BCH, and System Information Block type 6 is not scheduled on BCH, or any of System Information Block type 5, type 5bis or type 6 is scheduled but IE "AICH info" (FDD) or IE "PICH info" is not present, the UE shall:

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

If System Information Block type 7 is not scheduled on BCH, the UE shall:

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

In 3.84 Mcps TDD, if System Information Block type 14 is not scheduled on BCH, the UE shall:

1> consider the cell to be barred according to [4]; and

1> consider the barred cell as using the value "allowed" in the IE "Intra-frequency cell re-selection indicator", and the maximum value in the IE " $T_{\text{barred}}$ ".

#### 8.1.1.6.1 System Information Block type 1

The UE should store all relevant IEs included in this system information block if the UE is operating in "GSM-MAP mode" ~~the "PLMN Type" in the variable SELECTED\_PLMN has the value "GSM-MAP"~~ and the IE "PLMN type" in the Master Information Block has the value "GSM-MAP" or "GSM-MAP and ANSI-41". The UE shall also:

1> check that the cell, according to information included in IE "CN common GSM-MAP NAS system information", is suitable [4];

1> if in connected mode:

2> not forward the content of the IE "CN common GSM-MAP NAS system information" to upper layers.

1> if in idle mode:

2> forward the content of the IE "CN common GSM-MAP NAS system information" to upper layers.

1> for the IE "CN domain system information list":

2> for each IE "CN domain system information" that is present:

3> check that the cell, according to information included in IE "CN domain specific NAS system information", is suitable [4];

3> if in connected mode:

4> not forward the content of the IE "CN domain specific NAS system information" to upper layers.

3> if in idle mode:

4> forward the content of the IE "CN domain specific NAS system information" and the IE "CN domain identity" to upper layers;

4> use the IE "CN domain specific DRX cycle length coefficient" to calculate frame number for the Paging Occasions as specified in [4];

4> store the value of the IE "CN domain specific DRX cycle length coefficient" for use in connected mode.

2> if an IE "CN domain system information" is not present for a particular CN domain:

3> if in idle mode:

4> indicate to upper layers that no CN system information is available for that CN domain.

1> if the UE has not yet entered UTRA RRC connected mode:

2> store the values of the IE "UE Timers and constants in connected mode" in the variable TIMERS\_AND\_CONSTANTS.

1> use the values stored in the variable TIMERS\_AND\_CONSTANTS for the relevant timers and constants.



### 8.1.1.6.13 System Information Block type 13

If in idle or connected mode, the UE should store all relevant IEs included in this system information block except for the IEs "CN domain specific DRX cycle length coefficient", "UE timers and constants in idle mode" and "Capability update requirement" which shall be stored only in the idle mode case. The UE shall read System Information Block type 13 and the associated System Information Block types 13.1, 13.2, 13.3 and 13.4 only when the [UE is operating in "ANSI-41 mode"](#) ~~"PLMN Type" in the variable SELECTED\_PLMN has the value "ANSI-41"~~ and the IE "PLMN type" in the Master Information Block has the value "ANSI-41" or "GSM-MAP and ANSI-41". The UE shall also:

- 1> forward the content of the IE "CN domain specific NAS system information" to the non-access stratum entity indicated by the IE "CN domain identity";
- 1> use the IE "CN domain specific DRX cycle length coefficient" to calculate frame number for the Paging Occasions and Page indicator as specified in [4].

Refer to TIA/EIA/IS-2000.5-A for actions on information contained in System Information Block types 13.1, 13.2, 13.3 and 13.4.

### 8.1.1.6.18 System Information Block type 18

If the System Information Block type 18 is present, a UE shall obtain knowledge of the PLMN identity of the neighbour cells to be considered for cell reselection, and shall behave as specified in this subclause and in subclause 8.5.14a.

The UE should store all the relevant IEs included in this system information block.

A UE in idle mode shall act according to the following rules:

- 1> any PLMN list of a given type (IEs "PLMNs of intra-frequency cells list", "PLMNs of inter-frequency cells list", "PLMNs of inter-RAT cell lists") included in the IE "Idle mode PLMN identities" is paired with the list of cells of the same type derived from System Information Block type 11;
- 1> the PLMN identity located at a given rank in the PLMN list is that of the cell with the same ranking in the paired list of cells, the cells being considered in the increasing order of their associated identities ("Intra-frequency cell id", "Inter-frequency cell id", "Inter-RAT cell id");
- 1> [if no identity is indicated for the first PLMN in a list, the UE shall assume that the neighbouring cell broadcasts the same PLMN configuration \(i.e. IE "PLMN Identity" and IE "Multiple PLMN List"\) as the current cell;](#)
- 1> [if no identity is indicated for another entry in the list, the UE shall assume that the neighbouring cell broadcasts the same PLMN configuration \(i.e. IE "PLMN Identity" and IE "Multiple PLMN List"\) as the previous cell in the list;](#)
- 1> if the number of identities in a PLMN list exceeds the number of neighbour cells in the paired list (if any), the extra PLMN identities are considered as unnecessary and ignored;
- 1> if the number of identities in a PLMN list (if any) is lower than the number of neighbour cells in the paired list, the missing PLMN identities are replaced by the ~~last PLMN configuration for the identity~~ [the last cell in the list if present, otherwise by the identity of the selected PLMN.](#)

A UE in connected mode shall act in the same manner as a UE in idle mode with the following modifications:

- 1> the PLMN lists to be considered are the ones included, when present, in the IE "Connected mode PLMN identities"; otherwise, the UE shall use, in place of any missing list, the corresponding one in the IE "Idle mode PLMN identities";
- 1> the paired lists of cells are the ones derived from System Information Block type 11, and System Information Block type 12 if present.

### 8.1.3.9 Reception of an RRC CONNECTION REJECT message by the UE

When the UE receives an RRC CONNECTION REJECT message on the downlink CCCH, it shall compare the value of the IE "Initial UE identity" in the received RRC CONNECTION REJECT message with the value of the variable INITIAL\_UE\_IDENTITY:

If the values are different, the UE shall ignore the rest of the message;

If the values are identical, the UE shall:

- 1> stop timer T300; and
- 1> clear the entry for the RRC CONNECTION REJECT message in the table "Accepted transactions" in the variable TRANSACTIONS;
- 1> if the UE has disabled cell reselection to a UTRA carrier due to an earlier RRC CONNECTION REJECT message, the UE shall resume cell reselection to that UTRA carrier;
- 1> if the IE "wait time"  $\leq$  '0'; and
- 1> if the IE "frequency info" is present and:
  - 2> if V300 is equal to or smaller than N300:
    - 3> select a suitable UTRA cell according to [4] on that frequency;
    - 3> after having selected and camped on a suitable cell on the designated UTRA carrier:
      - 4> set CFN in relation to SFN of current cell according to subclause 8.5.15;
      - 4> set the contents of the RRC CONNECTION REQUEST message according to subclause 8.1.3.3;
      - 4> perform the mapping of the Access Class to an Access Service Class as specified in subclause 8.5.13, and apply the given Access Service Class when accessing the RACH;
      - 4> transmit an RRC CONNECTION REQUEST message on the uplink CCCH;
      - 4> reset counter V300;
      - 4> start timer T300 when the MAC layer indicates success or failure in transmitting the message;
      - 4> disable cell reselection to original UTRA carrier until the time stated in the IE "wait time" has elapsed or until the RRC connection establishment procedure ends, whichever occurs first;
    - 3> if no suitable cell on the designated UTRA carrier is found:
      - 4> wait for at least the time stated in the IE "wait time";
      - 4> set CFN in relation to SFN of current cell according to subclause 8.5.15;
      - 4> set the IEs in the RRC CONNECTION REQUEST message according to subclause 8.1.3.3;
      - 4> perform the mapping of the Access Class to an Access Service Class as specified in subclause 8.5.13, and apply the given Access Service Class when accessing the RACH;
      - 4> then submit a new RRC CONNECTION REQUEST message to the lower layers for transmission on the uplink CCCH of the original serving cell;
      - 4> increment counter V300;
      - 4> restart timer T300 when the MAC layer indicates success or failure to transmit the message;
  - 2> if V300 is greater than N300:
    - 3> enter idle mode;
    - 3> perform the actions specified in subclause 8.5.2 when entering idle mode from connected mode;
    - 3> consider the RRC establishment procedure to be unsuccessful;
    - 3> the procedure ends.
- 1> if the IE "inter-RAT info" is present and:
  - 2> if V300 is equal to or smaller than N300:

- 3> if the IE "GSM target cell info" is present:
  - 4> attempt to camp on a suitable cell of the list of cells indicated for that RAT;
  - 4> if the UE selects and camps on one of the cells indicated for that RAT:
    - 5> disable cell reselection to the original RAT until the time stated in the IE "wait time" has elapsed.
  - 4> if the UE cannot find any suitable cell from the indicated ones within 10s, the UE is allowed to camp on any suitable cell on that RAT.
- 3> if the IE "GSM target cell info" is not present:
  - 4> select a suitable cell ~~belonging to the selected PLMN or any PLMN indicated to be equivalent to that PLMN~~ in the designated RAT;
  - 4> after having selected and camped on a suitable cell on the designated RAT:
    - 5> disable cell reselection to the original RAT until the time stated in the IE "wait time" has elapsed or until the UE successfully establishes a connection on the designated RAT, whichever occurs first.
- 3> if no suitable cell in the designated RAT is found:
  - 4> wait at least the time stated in the IE "wait time";
  - 4> set CFN in relation to SFN of current cell according to subclause 8.5.15;
  - 4> set the IEs in the RRC CONNECTION REQUEST message according to subclause 8.1.3.2.
  - 4> perform the mapping of the Access Class to an Access Service Class as specified in subclause 8.5.13, and apply the given Access Service Class when accessing the RACH;
  - 4> then submit a new RRC CONNECTION REQUEST message to the lower layers for transmission on the uplink CCCH;
  - 4> increment counter V300;
  - 4> restart timer T300 when the MAC layer indicates success or failure to transmit the message;
- 2> if V300 is greater than N300:
  - 3> enter idle mode;
  - 3> perform the actions specified in subclause 8.5.2 when entering idle mode from connected mode;
  - 3> consider the RRC establishment procedure to be unsuccessful;
  - 3> the procedure ends.
- 1> If neither the IEs "frequency info" nor "inter-RAT info" are present and:
  - 2> if V300 is equal to or smaller than N300:
    - 3> wait at least the time stated in the IE "wait time";
    - 3> set the IEs in the RRC CONNECTION REQUEST message according to subclause 8.1.3.2;
    - 3> perform the mapping of the Access Class to an Access Service Class as specified in subclause 8.5.13, and apply the given Access Service Class when accessing the RACH;
    - 3> submit a new RRC CONNECTION REQUEST message to the lower layers for transmission on the uplink CCCH;
    - 3> increment counter V300;
    - 3> restart timer T300 when the MAC layer indicates success or failure to transmit the message;

- 2> if V300 is greater than N300:
  - 3> enter idle mode;
  - 3> perform the actions specified in subclause 8.5.2 when entering idle mode from connected mode;
  - 3> consider the RRC establishment procedure to be unsuccessful;
  - 3> the procedure ends.
- 1> if the IE "wait time" = '0':
  - 2> enter idle mode;
  - 2> perform the actions specified in subclause 8.5.2 when entering idle mode from connected mode;
  - 2> consider the RRC establishment procedure to be unsuccessful;
  - 2> the procedure ends.

### 8.5.1 Selection of initial UE identity

The purpose of the IE "Initial UE identity" is to provide a unique UE identification at the establishment of an RRC connection. The type of identity shall be selected by the UE according to the following.

~~If the UE is operating in "GSM-MAP mode", Upper layers shall set the variable SELECTED\_PLMN. If the variable SELECTED\_PLMN in the UE indicates "GSM-MAP",~~ the UE shall choose "UE id type" in the IE "Initial UE identity" with the following priority:

1. TMSI (GSM-MAP): The TMSI (GSM-MAP) shall be chosen if available. The IE "LAI" in the IE "Initial UE identity" shall also be present when TMSI (GSM-MAP) is used, for making it unique.
2. P-TMSI (GSM-MAP): The P-TMSI (GSM-MAP) shall be chosen if available and no TMSI (GSM-MAP) is available. The IE "RAI" in the IE "Initial UE identity" shall in this case also be present when P-TMSI (GSM-MAP) is used, for making it unique.
3. IMSI (GSM-MAP): The IMSI (GSM-MAP) shall be chosen if available and no TMSI (GSM-MAP) or P-TMSI is available.
4. IMEI: The IMEI shall be chosen when none of the above three conditions are fulfilled.

When being used, the IEs "TMSI (GSM-MAP)", "P-TMSI (GSM-MAP)", "IMSI (GSM-MAP)", "LAI" and "RAI" shall be set equal to the values of the corresponding identities stored in the USIM or SIM.

~~If the UE is operating in "ANSI-41 mode", If the variable SELECTED\_PLMN in the UE indicates "ANSI-41",~~ the UE shall choose "UE id type" in the IE "Initial UE identity" according to the procedure specified in the 3GPP2 document "3GPP2 C.P0004-A".

### 8.5.2 Actions when entering idle mode from connected mode

When entering idle mode from connected mode, the UE shall:

- 1> clear or set variables upon leaving UTRA RRC connected mode as specified in subclause 13.4;
- 1> if the RRC CONNECTION RELEASE message was received and the IE "Redirection info" was present therein:
  - 2> attempt to camp on a suitable cell on the indicated UTRA carrier included in the RRC CONNECTION RELEASE message;
  - 2> attempt to camp on a suitable cell of the list of cells for the indicated RAT included in the RRC CONNECTION RELEASE message. If no cells were indicated for that RAT or no suitable cell of the indicated cells for that RAT is found within 10s, attempt to camp on any suitable cell of that RAT; or
  - 2> if no suitable cell is found on the indicated UTRA carrier or RAT camp on any suitable cell.

1> attempt to select a suitable cell to camp on.

When leaving connected mode according to [4], the UE shall:

1> perform cell selection.

While camping on a cell, the UE shall:

1> acquire system information according to the system information procedure in subclause 8.1;

1> perform measurements according to the measurement control procedure specified in subclause 8.4; and

1> if the UE is registered:

2> be prepared to receive paging messages according to the paging procedure in subclause 8.2.

If the UE is operating in "GSM-MAP mode"~~IE "PLMN identity" within variable SELECTED\_PLMN has the value "GSM-MAP"~~, the UE shall:

1> delete any NAS system information received in connected mode;

1> acquire the NAS system information in system information block type 1; and

1> proceed according to subclause 8.6.1.2.

When entering idle mode, the UE shall:

1> if the USIM is present, for each CN domain:

2> if a new security key set was received for this CN domain but was not used either for integrity protection or ciphering during this RRC connection:

3> set the START value for this domain to zero; and

3> store this START value for this domain in the USIM.

2> else:

3> if the current "START" value, according to subclause 8.5.9 for a CN domain, is greater than or equal to the value "THRESHOLD" of the variable START\_THRESHOLD:

4> delete the ciphering and integrity keys that are stored in the USIM for that CN domain;

4> inform the deletion of these keys to upper layers.

3> else:

4> store the current "START" value for this CN domain on the USIM.

NOTE: Prior to storing the "START" value, the UE should calculate this "START" value according to subclause 8.5.9.

1> else:

2> if the SIM is present, for each CN domain:

3> if a new security key set was received for this CN domain but was not used either for integrity protection or ciphering during this RRC connection:

4> set the START value for this domain to zero; and

4> store this START value for this domain in the UE

3> else:

4> if the current "START" value, according to subclause 8.5.9 for this CN domain, is greater than or equal to the value "THRESHOLD" of the variable START\_THRESHOLD:

- 5> delete the Kc key for this CN domain;
  - 5> delete the ciphering and integrity keys that are stored in the UE for that CN domain;
  - 5> set the "START" values for this CN domain to zero and store it the UE;
  - 5> inform the deletion of the key to upper layers.
- 4> else:
- 5> store the current "START" value for this CN domain in the UE.

NOTE: Prior to storing the "START" value, the UE should calculate this "START" value according to subclause 8.5.9.

## 8.5.14 PLMN Type Selection

Depending on UE configuration, the UE is operating in "ANSI-41 mode" or "GSM-MAP mode".

*The UE shall perform PLMN selection and reselection as stated in [4] and store the identifier of the chosen PLMN in the variable `SELECTED_PLMN` as follows. The UE shall:*

- 1> if a GSM-MAP type of PLMN is selected:*
  - 2> set the "PLMN Type" in the variable `SELECTED_PLMN` to "GSM-MAP";*
  - 2> and store the PLMN identity of that PLMN.*
- 1> if an ANSI-41 type of PLMN is selected:*
  - 2> set the "PLMN Type" in the variable `SELECTED_PLMN` to "ANSI-41";*
  - 2> and store the System identification (SID) of that PLMN.*

### 8.5.14a Neighbour cells list narrowing for cell reselection

While a UE is camping on a suitable cell, a UE having performed the PLMN identification of the neighbour cells as specified in 8.1.1.6.18 shall narrow the cell list to be used for cell reselection ([4]) to those neighbour cells for which that do satisfy one of the following criteria:

- ~~1> the PLMN identity of the neighbour cell is part of the PLMN's that can make a cell suitable as defined in [4]. is the identity of the selected PLMN;~~
- ~~1> the PLMN identity of the neighbour cell is indicated by higher layers to be equivalent to the identity of the selected PLMN.~~

## 8.5.24 Change of PLMN while in RRC connected mode

If the UE camps on an acceptable cell to obtain limited service while in RRC connected mode the UE shall:

- 1> keep the RRC connection ~~of the selected PLMN~~ and its behaviour, while camping on the an acceptable cell of the other PLMN shall be as if in Idle mode in that PLMN;
- 1> if the UE re-enters "in service area" in a suitable cell, on the selected PLMN or cannot maintain limited service (i.e. cannot find any acceptable cell of any PLMN), the UE shall resume its RRC Connected mode behaviour as if it had not camped on any cell whilst being in "out of service area".

The UE shall:

- 1> if the NAS indicates the selection of a new PLMN resulting from manual- or automatic mode PLMN selection [25] while the UE is in RRC connected mode ~~in the selected PLMN, or~~

1> -if the UE attempts transmission on an acceptable cell while the UE is in RRC connected mode of another PLMN (i.e. to initiate emergency call), the UE shall ~~for the selected PLMN~~:

- 2+> move to idle mode;
- 2+> release all dedicated resources;
- 2+> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED\_SIGNALLING\_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED\_RABS) to upper layers;
- 2+> clear the variable ESTABLISHED\_SIGNALLING\_CONNECTIONS;
- 2+> clear the variable ESTABLISHED\_RABS; and
- 2+> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode.

NOTE: NAS can inform AS about a new selected PLMN as a result of a PLMN selection (manual- or automatic mode PLMN selection (see [25])), or as a result of network signalling (after inter-RAT handover or inter-PLMN SRNS relocation). Only in the first case (manual- or automatic mode PLMN selection), this will result in an immediate RRC connection release.

### 8.6.1.2 CN information info

If the IE "CN information info" is present in a message, the UE shall:

- 1> if present, forward the content of the IE "PLMN identity" to upper layers;
- 1> if present, forward the content of the IE "CN common GSM-MAP NAS system information" to upper layers;
- 1> if the IE "CN domain related information" is present:
  - 2> forward each occurrence of the IE "CN domain specific GSM-MAP NAS system info" together with the IE "CN domain identity" to upper layers.
  - 2> if an IE "CN domain specific GSM-MAP NAS system info" is not present for a particular CN domain:
    - 3> indicate to upper layers that no CN system information is available for that CN domain.

~~If the "PLMN identity" is present, the UE shall consider this PLMN to be the selected PLMN (see [4]).~~

NOTE: If the "PLMN identity" is to be present in an IE "CN information info" sent in a UTRAN MOBILITY INFORMATION to a UE in a cell broadcasting IE "Multiple PLMN List", it should contain the PLMN identity in the IE "PLMN Identity" of the MIB.

### 10.3.7.53a PLMN identities of neighbour cells

This IE contains the PLMN identities of neighbour cells.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PLMNs of intra-frequency cells list	OP	1 to <maxCellM eas>		
>PLMN identity	<del>MDOP</del>		PLMN identity 10.3.1.11	Action when not present is specified in section 8.1.1.6.18 Default value is the previous "PLMN identity" in the list. The default value for the first PLMN in the list is the identity of the selected PLMN if the "PLMN type" in the variable SELECTED_PLMN has the value "GSM-MAP"; otherwise, the first occurrence is MP.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PLMNs of inter-frequency cells list	OP	1 to <maxCellIM eas>		
>PLMN identity	<del>OP</del>		PLMN identity 10.3.1.11	Action when not present is specified in section 8.1.1.6.18 Default value is the previous "PLMN identity" in the list. The default value for the first PLMN in the list is the identity of the selected PLMN if the "PLMN type" in the variable SELECTED_PLMN has the value "GSM-MAP"; otherwise, the first occurrence is MP.
PLMNs of inter-RAT cells list	OP	1 to <maxCellIM eas>		
>PLMN identity	<del>OP</del>		PLMN identity 10.3.1.11	Action when not present is specified in section 8.1.1.6.18 Default value is the previous "PLMN identity" in the list. The default value for the first PLMN in the list is the identity of the selected PLMN if the "PLMN type" in the variable SELECTED_PLMN has the value "GSM-MAP"; otherwise, the first occurrence is MP.

### 13.4.21 Void SELECTED\_PLMN

This variable contains the type of and identity of the selected PLMN.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PLMN-Type	MP		PLMN-Type 10.3.1.12	
<i>CHOICE identity-type</i>	MP			
>PLMN identity			PLMN identity 10.3.1.11	
>SID			SID 10.3.9.11	

<i>CHOICE identity-type</i>	Condition under which the given identity-type is chosen
PLMN identity	PLMN-Type is "GSM-MAP"
SID	PLMN-Type is "ANSI-41"



### 13.4.32 VALUE\_TAG

This variable contains information about the value tag for the last received system information block of a given type, for all system information blocks using value tags. The UE shall maintain one instance of this variable for the current selected cell. The UE may store several instances of this variable, one for each cell, to be used if the UE returns to these cells.

All IEs in this variable shall be cleared when switched off. All IEs in this variable except for the IE "SIB 16 value tag list" shall be cleared at selection of a new [cell and this cell broadcasts an IE "PLMN Identity" in the MIB which is different from the IE "PLMN Identity" broadcast in the MIB in the previously selected cell](#). The IE "SIB 16 value tag list" is cleared [when NAS informs AS about at selection of a new selected PLMN](#) ~~which is not indicated by higher layers to be equivalent to the previously selected PLMN~~.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
MIB value tag	OP		MIB value tag 10.3.8.9	Value tag for the master information block
SB 1 value tag	OP		Cell value tag 10.3.8.4	Value tag for the scheduling block type 1
SB 2 value tag	OP		Cell value tag 10.3.8.4	Value tag for the scheduling block type 2
SIB 1 value tag	CV-GSM		PLMN value tag 10.3.8.10	Value tag for the system information block type 1
SIB 2 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 2
SIB 3 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 3
SIB 4 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 4
SIB 5 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 5
SIB 6 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 6
CHOICE mode	MP			
>FDD				
>>SIB 8 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 8
>TDD				(no data)
SIB 11 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 11
SIB 12 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 12
SIB 13 value tag	CV-ANSI		Cell value tag 10.3.8.4	Value tag for the system information block type 13
SIB 13.1 value tag	CV-ANSI		Cell value tag 10.3.8.4	Value tag for the system information block type 13.1
SIB 13.2 value tag	CV-ANSI		Cell value tag 10.3.8.4	Value tag for the system information block type 13.2
SIB 13.3 value tag	CV-ANSI		Cell value tag 10.3.8.4	Value tag for the system information block type 13.3
SIB 13.4 value tag	CV-ANSI		Cell value tag 10.3.8.4	Value tag for the system information block type 13.4
SIB 15 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 15
SIB 15.1 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 15.1
SIB 15.2 value tag list	OP	1 to <maxSat>		List of value tags for all stored occurrences of system information block type 15.2
>SIB 15.2 value tag	MP		Cell value tag 10.3.8.4	
>SIB occurrence identity and value tag	MP		SIB occurrence identity and value tag 10.3.8.20b	

Information Element/Group name	Need	Multi	Type and reference	Semantics description
SIB 15.3 value tag list	OP	1 to <maxSat>		List of value tags for all stored occurrences of system information block type 15.3
>SIB 15.3 value tag	MP		PLMN value tag 10.3.8.10	Value tag for the system information block type 15.3
>SIB occurrence identity and value tag	MP		SIB occurrence identity and value tag 10.3.8.20b	
SIB 15.4 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 15.4
SIB 15.5 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 15.5
SIB 16 value tag list	OP	1 to <maxPred efConfig>		List of value tags for all stored occurrences of the system information block type 16
>Predefined configuration identity and value tag	MP		Predefined configuration identity and value tag 10.3.8.11	
SIB 18 value tag	OP		Cell value tag 10.3.8.4	Value tag for the system information block type 18

Condition	Explanation
GSM	This information is optional when <a href="#">the UE is operating in the PLMN Type in the variable SELECTED_PLMN is "GSM-MAP mode"</a> and never stored otherwise.
ANSI	This information is optional when the <a href="#">UE is operating in PLMN Type in the variable SELECTED_PLMN is "ANSI-41 mode"</a> and never stored otherwise.