**3GPP TSG-RAN WG2 Meeting #117-e *R2-22xxxxx***

**Electronic, 2022-02-21 - 2022-03-03**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **36.304** | **CR** | **0839** | **rev** | **1** | **Current version:** | **16.6.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Introduction of MINT [MINT] |
|  |  |
| ***Source to WG:*** | Ericsson, Lenovo, Motorola Mobility |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | TEI17 |  | ***Date:*** | 2022-02-17 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | CT1 is specifying a feature referred to as MINT. This feature is about PLMNs which experiencing outage during disasters. This feature allows UEs of PLMN which is experiencing so called "disaster conditions" to roam in other networks. Such type of roaming is called disaster roaming.Two aspects of this feature impacts RAN2. Namely:1. **Provision of disaster roaming information**: A network should be able to indicate which PLMNs' UEs are allowed to do disaster roaming.
2. **UAC for disaster roaming UEs**: A network should be able to bar UEs doing disaster roaming more aggresively than non-disaster roaming UEs. A UE that is doing disaster roaming will be applying Access Identity 3.

It should be clarified in the functional division between AS and NAS how the UE handles the disaster roaming information. |
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| ***Summary of change:*** | Captured that AS forwards disaster roaming information to NAS and NAS maintains this information. |
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| ***Consequences if not approved:*** | MINT is not supported in 36.304. |
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| ***Clauses affected:*** | 2, 4.2, 5.3.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 36.300 CR 1352TS 36.306 CR 1837TS 36.331 CR 4755 |
| ***affected:*** |  | **N** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **N** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | **Rev 1:**Editorial corrections on the cover pageReference to 22.261 added in References clause.Access Identity 3 handling is captured in 5.3.1 |

Beginning of changes

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 25.990: "Vocabulary for UTRAN".

[2] 3GPP TS 36.300: "E-UTRA and E-UTRAN Overall Description; Stage 2".

[3] 3GPP TS 36.331: "E-UTRA; Radio Resource Control (RRC) - Protocol Specification".

[4] 3GPP TS 22.011: "Service accessibility".

[5] 3GPP TS 23.122: "NAS functions related to Mobile Station (MS) in idle mode".

[6] 3GPP TS 36.213: "E-UTRA; Physical layer procedures".

[7] 3GPP TS 36.214: "E-UTRA; Physical layer; Measurements".

[8] 3GPP TS 25.304: "User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode"

[9] 3GPP TS 43.022: "Functions related to Mobile Station in idle mode and group receive mode".

[10] 3GPP TS 36.133: "Requirements for Support of Radio Resource Management".

[11] void

[12] void

[13] void

[14] void

[15] void

[16] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3"

[17] 3GPP2 C.S0024-C v2.0: "cdma2000 High Rate Packet Data Air Interface Specification".

[18] 3GPP2 C.S0005-F v1.0: "Upper Layer (Layer 3) Signalling Standard for cdma2000 Spread Spectrum Systems".

[19] 3GPP TS 25.304: "User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".

[20] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3"

[21] 3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".

[22] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[23] 3GPP TS 23.401: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[24] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[25] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".

[26] IEEE 802.11, Part 11: "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std.".

[27] Wi-Fi Alliance Technical Committee, Hotspot 2.0 Technical Task Group: "Hotspot 2.0 (Release 2) Technical Specification".

[28] 3GPP TS 24.302: "Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks".

[29] 3GPP TS 23.303: "Proximity-based services (ProSe); Stage 2".

[30] 3GPP TS 36.321: "E-UTRA; Medium Access Control (MAC) protocol specification".

[31] 3GPP TS 24.105: "Application specific Congestion control for Data Communication (ACDC) Management Object (MO)".

[32] 3GPP TS 31.102: "Characteristics of the Universal Subscriber Identity Module (USIM) application".

[33] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

[34] Void

[35] 3GPP TS 23.003: "Numbering, addressing and identification".

[36] 3GPP TS 23.285: "Technical Specification Group Services and System Aspects; Architecture enhancements for V2X services".

[37] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[38] 3GPP TS 38.304: "New Generation Radio Access Network; User Equipment (UE) procedures in Idle mode and RRC Inactive state".

[39] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[40] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[x] 3GPP TS 22.261: "Service requirements for the 5G system; Stage 1".

Next change

## 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 TS 23.122 [5] and the AS part in the present document.

| Idle Mode Process | UE Non-Access Stratum | UE Access Stratum |
| --- | --- | --- |
| PLMN Selection  | Maintain a list of PLMNs in priority order according to TS 23.122 [5]. Select a PLMN using automatic or manual mode as specified in TS 23.122 [5] and request AS to select a cell belonging to this PLMN. For each PLMN, associated RAT(s) may be set.Evaluate reports of available PLMNs and, for E-UTRA if the UEs supports E-UTRA connected to 5GC, CN type(s) from AS for PLMN selection.Maintain a list of equivalent PLMN identities.Maintain applicable disaster roaming information for available PLMNs including potential disaster PLMNs for available PLMNs. | Search for available PLMNs.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 TS 23.122 [5].Perform measurements to support PLMN selection.Synchronise to a broadcast channel to identify found PLMNs (and CN type(s).Report available PLMNs with associated RAT(s) and, for E-UTRA if the UE supports E-UTRA connected to 5GC, CN type(s) to NAS on request from NAS or autonomously.Report applicable disaster roaming information for available PLMNs autonomously including potential disaster PLMNs. |
| Cell Selection | 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 and a list of CSG IDs and their associated PLMN ID on which the UE is allowed (CSG whitelist) and provide these lists to AS.NAS may indicate whether the use of coverage enhancements is not authorized for the selected PLMN.NAS may indicate whether the CE mode B is restricted for the UE supporting CE mode B.For E-UTRA if the UE supports E-UTRA connected to 5GC, NAS indicates the CN type to be used for the selected cell. | Perform measurements needed to support cell selection.Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS.Search for a suitable cell. The cells broadcast one or more 'PLMN identity' in the system information. Respond to NAS whether such cell is found or not.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 TS 23.122 [5].If such a cell is found, the cell is selected to camp on.For E-UTRA if the UE supports E-UTRA connected to 5GC, AS reports the CN type(s) for which the selected cell is suitable to NAS. |
| Cell Reselection | Control cell reselection by for example, maintaining lists of forbidden registration areas.Maintain a list of equivalent PLMN identities and provide the list to AS.Maintain a list of forbidden registration areas and provide the list to AS.Maintain a list of CSG IDs and their associated PLMN ID on which the UE is allowed (CSG whitelist) to camp and provide the list to AS.For E-UTRA if the UE supports E-UTRA connected to 5GC, NAS indicates the CN type to be used for the selected cell. | Perform measurements needed to support cell reselection.Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS.Change cell if a more suitable cell is found.For E-UTRA if the UE supports E-UTRA connected to 5GC, the UE reports the CN type(s) for which the selected cell is suitable to NAS. |
| Location registration | Register the UE as active after power on.Register the UE's presence in a registration area, for instance regularly or when entering a new tracking area.Maintain lists of forbidden registration areas.Deregister UE when shutting down.Control and restrict location registration for a UE in eCall only mode. | Report registration area information to NAS. |
| Support for manual CSG selection | Provide request to search for available CSGs.Evaluate reports of available CSGs from AS for CSG selection.Select a CSG and request AS to select a cell belonging to this CSG. | Search for cells with a CSG ID.Read the HNB name from BCCH on SIB9 if a cell with a CSG ID is found.Report CSG ID of the found cell broadcasting a CSG ID together with the HNB name and PLMN(s) to NAS.On selection of a CSG by NAS, select any cell belonging to the selected CSG fulfilling the cell selection criteria and not barred or reserved for operator use for UEs not belonging to AC 11 or 15 and give an indication to NAS that access is possible (for the registration procedure). |
| RAN Notification Area Update | Not applicable | Register the UE's presence in a RAN-based notification area, periodically or when entering a new RAN-based notification area. |

Table 4.2-1: Functional division between AS and NAS in idle mode

Next change

### 5.3.1 Cell status and cell reservations

Cell status and cell reservations are indicated in the *SystemInformationBlockType1* message (or *SystemInformationBlockType1-BR* message or *SystemInformationBlockType1-NB* message) TS 36.331 [3] by means of the following fields:

- *cellBarred* (IE type: "barred" or "not barred")
This field indicates if the cell is barred for connectivity to EPC.
This field is ignored by the UEs supporting *crs-IntfMitig* while *crs-IntfMitigEnabled* is included in SIB1.
This field is ignored by the BL UEs or UEs in CE supporting *ce-CRS-IntfMitig* while *crs-IntfMigitNumPRBs* is included in SIB1-BR.
In case of multiple EPC PLMNs indicated in SIB1/SIB1-BR, this field is common for all EPC PLMNs

NOTE 1: IAB-MT ignores the *cellBarred*, *cellReservedForOperatorUse* and *intraFreqReselection* (i.e. treats *intraFreqReselection* as if it was set to *allowed*) as defined in TS 36.331 [3].

- *cellBarred-5GC* (IE type: "barred" or "not barred")
This field indicates if the cell is barred for connectivity to 5GC.
This field is ignored if the UE does not support E-UTRA connected to 5GC or if the UE supports network-based CRS interference mitigation and *nw-BasedCRS-InterferenceMitigation* is included in *SystemInformationBlockType1*.
In case of multiple 5GC PLMNs indicated in SIB1, this field is common for all 5GC PLMNs.

- *cellReservedForOperatorUse* (IE type: "reserved" or "not reserved")
This field indicates if the cell is reserved for operator use.
This field is ignored by the UEs supporting *crs-IntfMitig* while *crs-IntfMitigEnabled* is included in SIB1.
This field is ignored by the BL UEs or UEs in CE supporting *ce-CRS-IntfMitig* while *crs-IntfMigitNumPRBs* is included in SIB1-BR.
In case of multiple EPC or 5GC PLMNs indicated in SIB1/SIB1-BR, this field is specified per EPC or 5GC PLMN.

- *cellBarred-CRS* (IE type: "barred" or "not barred")
This field indicates if the cell is barred for connectivity to EPC for UEs supporting network-based CRS interference mitigation.
*barred* means the cell is barred for UEs supporting *crs-IntfMitig* while *crs-IntfMitigEnabled* is included in SIB1. For BL UEs or UEs in CE capable of *ce-CRS-IntfMitig*, *barred* means the cell is barred while *crs-IntfMitigNumPRBs* is included in SIB1-BR.
This field is ignored by the UE if the UE does not support CRS interference mitigation or while *crs-IntfMitigConfig* is not included in SIB1 (SIB1-BR for BL UEs or UEs in CE).
In case of multiple PLMNs indicated in SIB1/SIB1-BR, this field is common for all PLMNs.

- *cellBarred-5GC-CRS* (IE type: "barred" or "not barred")
This field indicates if the cell is barred for connectivity to 5GC for UEs supporting network-based CRS interference mitigation.
This field is ignored if the UE does not support E-UTRA connected to 5GC or network-based CRS interference mitigation.
In case of multiple 5GC PLMNs indicated in SIB1, this field is common for all 5GC PLMNs.

- *cellReservedForOperatorUse-CRS* (IE type: "reserved" or "not reserved")
This field indicates if the cell is reserved for operator use for UEs supporting network-based CRS interference mitigation.
*reserved* means the cell is "reserved" for operator use for UEs supporting *crs-IntfMitig* while *crs-IntfMitigEnabled* is included in SIB1.
For BL UEs or UEs in CE capable of *ce-CRS-IntfMitig*, *reserved* means the cell is "reserved" for operator use while *crs-IntfMitigNumPRBs* is included in SIB1-BR.
This field is ignored if the UE does not support CRS interference mitigation or while *crs-IntfMitigConfig* is not included in SIB1 (SIB1-BR for BL UEs or UEs in CE).
In case of multiple PLMNs indicated in SIB1/SIB1-BR, this field is specified per PLMN.

- *iab-Support* (IE type: "true")

Indicated in *SIB1* message. In case of multiple PLMNs indicated in *SIB1*, this field is specified per PLMN. This field indicates if the cell is barred for IAB node or the cell does not support IAB node, or both. When this field is absent, the IAB node shall treat this cell as if cell status is barred.

The following description for handling of barred and reserved cells is per CN type. If the UE supports more than one CN type, the UE shall only exclude a cell as candidate for selection/reselection if it is excluded for both CN types.

NOTE 2: Fields *cellBarred-CRS* and *cellReservedForOperatorUse-CRS* are not indicated in *SystemInformationBlockType1-NB*

When cell status is indicated as "not barred" and "not reserved" for operator use,

- All UEs shall treat this cell as candidate during the cell selection and cell reselection procedures.

When cell status is indicated as "not barred" and "reserved" for operator use for any PLMN,

- UEs assigned to Access Class 11 or 15 operating in their HPLMN/EHPLMN shall treat this cell as candidate during the cell selection and reselection procedures if the field *cellReservedForOperatorUse* for that PLMN set to "reserved".

- UEs assigned to an Access Class in the range of 0 to 9, 12 to 14 or to Access Identity 3 shall behave as if the cell status is "barred" in case the cell is "reserved for operator use" for the registered PLMN or the selected PLMN.

NOTE 3: ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN; ACs 12, 13, 14 are only valid for use in the home country TS 22.011 [4].

NOTE X: Access Identity 3 is only valid for PLMNs that indicate to potential Disaster Inbound Roamers that the UEs can access the PLMN as specified in TS 22.261 [x].

When cell status "barred" is indicated or to be treated as if the cell status is "barred",

- The UE is not permitted to select/reselect this cell, not even for emergency calls.

- The UE shall consider other cells for cell selection/reselection according to the following rule:

- If the cell is to be treated as if the cell status is "barred" due to being unable to acquire the *MasterInformationBlock (*or *MasterInformationBlock-NB),* the *SystemInformationBlockType1 (*or *SystemInformationBlockType1-BR* message or *SystemInformationBlockType1-NB),* or the *SystemInformationBlockType2 (*or *SystemInformationBlockType2-NB)*:

- the UE may exclude the barred cell as a candidate for cell selection/reselection for up to 300 seconds.

- the UE may select another cell on the same frequency if the selection criteria are fulfilled.

- the UE may select the same cell in normal coverage if the UE was barred in the cell due to being unable to acquire *MasterInformationBlock*, *SystemInformationBlockType1-BR*, or *SystemInformationBlockType2* in enhanced coverage, but was able to acquire *MasterInformationBlock*, *SystemInformationBlockType1*, and *SystemInformationBlockType2* in normal coverage, if the selection criteria are fulfilled.

- the UE may select the same cell in enhanced coverage if the UE was barred in the cell due to being unable to acquire *MasterInformationBlock*, *SystemInformationBlockType1*, or *SystemInformationBlockType2* in normal coverage, but was able to acquire *MasterInformationBlock*, *SystemInformationBlockType1-BR*, and *SystemInformationBlockType2*, if the selection criteria are fulfilled.

- else

- If the cell is a CSG cell:

- the UE may select another cell on the same frequency if the selection/reselection criteria are fulfilled.

- else

- If the field *intraFreqReselection* in field *cellAccessRelatedInfo* in *SystemInformationBlockType1 (*or *SystemInformationBlockType1-BR* message or *SystemInformationBlockType1-NB)* message is set to "allowed", the UE may select another cell on the same frequency if re-selection criteria are fulfilled.

- The UE shall exclude the barred cell as a candidate for cell selection/reselection for 300 seconds.

- If the field *intraFreqReselection* in field *cellAccessRelatedInfo* in *SystemInformationBlockType1* (or *SystemInformationBlockType1-BR* message or *SystemInformationBlockType1-NB*) message is set to "not allowed" the UE shall not re-select a cell on the same frequency as the barred cell;

- The UE shall exclude the barred cell and the cells on the same frequency as a candidate for cell selection/reselection for 300 seconds.

The cell selection of another cell may also include a change of RAT or, if the previous and selected cell are both E-UTRA cells, a change of the CN type.