**3GPP TSG-RAN WG2 Meeting #110-e** **R2-200xxxx**

**Electronic, 1 Jun – 12 Jun 2020**

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| *CR-Form-v11.4* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.304** | **CR** | **0782** | **rev** | **2** | **Current version:** | **16.0.0** |  |
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| *For* [***HE******LP***](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:*** | Introduce of alternative cell reselection priority for EN-DC | | | | | | | | | |
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| ***Source to WG:*** | CMCC, SoftBank, Ericsson, Huawei, ZTE, CATT, vivo, OPPO | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16 | | | | |  | ***Date:*** | | | 2020-05-20 |
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| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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 can be 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-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | To allow different UEs to apply different cell reselection priorities the network can indicate to the UE if the UE shall use the legacy priorities or use alternative priorities. This can be used for example to make EN-DC capable UEs to apply different cell reselection priorities compared to non-EN-DC capable UEs such that EN-DC capable UEs are on frequencies on which EN-DC enabled cells are deployed. | | | | | | | | |
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| ***Summary of change:*** | | Rev1:  It is clarified that the UE shall use the *altCellReselectionPriority* and *altCellReselectionSubPriority* when the UE is informed to use the alternative priorities via *RRCConnectionRelease* message (with *altFreqPriorities* set to true) and if the *altCellReselectionPriority* and *altCellReselectionSubPriority* are broadcasted by the camped cell.  Rev2:  Update 5.2.4.1 to reflect the agreement ”For camped on any cell state, the legacy principle for dedicated priority can be reused, i.e. preserve the altFreqPriorities-r16 and in this state the UE shall apply the legacy priorities provided in system information rather than the alternative priority, and applies it upon entering Camped Normally state.”  Rev3:   * Add definition for Alternative cell reselection priority * Capture agreements from RAN2#109bis-e on *camped on any cell* state. | | | | | | | | |
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| ***Consequences if not approved:*** | | EN-DC UEs and other UEs will use the same cell reselection priorities, thus reducing network optimization possibilities. | | | | | | | | |
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| ***Clauses affected:*** | | 5.2.4.1 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 36.331 CR 4229  TS 36.306 CR 1755 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions 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, but restriction as in 5.3.3 apply.

**Alternative cell reselection priority:** Cell reselection priority broadcast via*altCellReselectionPriority* and *altCellReselectionSubPriority* in the system information.

**CSG Whitelist**: A list provided by NAS containing all the CSG identities and their associated PLMN IDs of the CSGs to which the subscriber belongs.

NOTE: This list is known as Allowed CSG List in Rel-8 Access Stratum specifications.

**Available PLMN(s):** One or more PLMN(s) for which the UE has found at least one cell and read its PLMN identity(ies).

**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.

**Closed Subscriber Group (CSG):** A Closed Subscriber Group identifies subscribers of an operator who are permitted to access one or more cells of the PLMN but which have restricted access (CSG cells).

**CN type:** The type of core network connectivity supported by an E-UTRA cell, either EPC or 5GC.

**Commercial Mobile Alert System:** Public Warning System that delivers *Warning Notifications* provided by *Warning Notification Providers* to CMAS capable UEs.

**CSG cell:** A cell broadcasting a CSG indication that is set to TRUE and a specific CSG identity.

**CSG identity:** An identifier broadcast by a CSG or hybrid cell/cells and used by the UE to facilitate access for authorised members of the associated Closed Subscriber Group.

**CSG member cell:** a cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN and for which the CSG whitelist of the UE includes an entry comprising cell's CSG ID and the respective PLMN identity.

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

**eDRX cycle:** Time interval between the first Paging Occasions occurring after successive extended DRX periods.

**eCall Only Mode:** A UE configuration option that allows the UE to attach at EPS and register in IMS to perform only eCall Over IMS, and a non-emergencyIMS call for test and/or terminal reconfiguration services.

**EHPLMN:** Any of the PLMN entries contained in the Equivalent HPLMN list TS 23.122 [5].

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

**EU-Alert:** Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

**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.

**HNB Name**: The Home eNodeB Name is a broadcast string in free text format that provides a human readable name for the Home eNodeB CSG identity and any broadcasted PLMN identity.

**HSDN cell**: A cell that has higher priority than other cells for cell reselection for HSDN capable UE in a High-mobility state.

**Hybrid cell:** A cell broadcasting a CSG Indicator that is set to FALSE and a specific CSG identity.

**Hyper SFN:** Index broadcast in System Information that increments at every SFN wrap around (i.e every 10.24s).

**Korean Public Alert System (KPAS):** Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

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

**MBMS-dedicated cell**: cell dedicated to MBMS transmission.

**MBMS/****Unicast-mixed cell**: cell supporting both unicast and MBMS transmissions.

**FeMBMS/Unicast-mixed cell**: cell supporting MBMS transmission and unicast transmission as SCell.

**NB-IoT:** NB-IoT allows access to network services via E-UTRA with a channel bandwidth limited to 200 kHz.

**NR sidelink communication**: AS functionality enabling at least V2X Communication as defined in TS 23.287 [40], between two or more nearby UEs, using NR technology but not traversing any network node.

**Paging Time Window:** The period configured for a UE in extended DRX, during which the UE monitors Paging Occasions following DRX cycle.

**Power saving mode**: Mode allowing the UE to reduce its power consumption, as defined in TS 24.301 [16], TS 23.401 [23], TS 23.682 [24].

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

**Radio Access Technology:** Type of technology used for radio access, for instance E-UTRA, UTRA, GSM, CDMA2000 1xEV-DO (HRPD) or CDMA2000 1x (1xRTT).

**Registered PLMN:** This is the PLMN on which certain Location Registration outcomes have occurred TS 23.122 [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.

**Sidelink**: UE to UE interface for sidelink communication, V2X sidelink communication and sidelink discovery. The Sidelink corresponds to the PC5 interface as defined in TS 23.303 [29].

**Sidelink communication**: AS functionality enabling ProSe Direct Communication as defined in TS 23.303 [29], between two or more nearby UEs, using E-UTRA technology but not traversing any network node. The terminology "sidelink communication" without "V2X" prefix only concerns PS unless specifically stated otherwise.

**Sidelink discovery**: AS functionality enabling ProSe Direct Discovery as defined in TS 23.303 [29], using E-UTRA technology but not traversing any network node.

**Strongest cell:** The cell on a particular carrier that is considered strongest according to the layer 1 cell search procedure TS 36.213 [6], TS 36.214 [7].

**Suitable Cell:** This is a cell on which an UE may camp. For a E-UTRA cell, the criteria are defined in clause 4.3, for a UTRA cell in TS 25.304 [8], for a GSM cell in TS 43.022 [9], and for a NR cell in TS 38.304 [38].

**V2X sidelink communication:** AS functionality enabling V2X Communication as defined in TS 23.285 [36], between nearby UEs, using E-UTRA technology but not traversing any network node.

### 5.2.4 Cell Reselection evaluation process

#### 5.2.4.1 Reselection priorities handling

Absolute priorities of different E-UTRAN frequencies or inter-RAT frequencies may be provided to the UE in the system information, in the *RRCConnectionRelease* message, or by inheriting from another RAT at inter-RAT cell (re)selection. In the case of system information, an E-UTRAN frequency or inter-RAT frequency may be listed without providing a priority (i.e. the field *cellReselectionPriority* is absent for that frequency). If priorities are provided in dedicated signalling, the UE shall ignore all the priorities provided in system information. If UE is in *camped on any cell* state, UE shall only apply the priorities provided by system information from current cell, and the UE preserves priorities provided by dedicated signalling, *deprioritisationReq* received in *RRCConnectionReject* and *altFreqPriorities* provided by dedicated signalling unless specified otherwise. When the UE in *camped normally* state, has only dedicated priorities other than for the current frequency, the UE shall consider the current frequency to be the lowest priority frequency (i.e. lower than any of the network configured values). While the UE is camped on a suitable CSG cell in normal coverage, the UE shall always consider the current frequency to be the highest priority frequency (i.e. higher than any of the network configured values), irrespective of any other priority value allocated to this frequency. When the HSDN capable UE is in High-mobility state, the UE shall always consider the HSDN cells to be the highest priority (i.e. higher than any other network configured priorities). When the HSDN capable UE is not in High-mobility state, the UE shall always consider HSDN cells to be the lowest priority (i.e. lower than network configured priorities). If the UE capable of sidelink communication is configured to perform sidelink communication and can only perform the sidelink communication while camping on a frequency, the UE may consider that frequency to be the highest priority. If the UE capable of V2X sidelink communication is configured to perform V2X sidelink communication and can only perform the V2X sidelink communication while camping on a frequency, the UE may consider that frequency to be the highest priority. If the UE capable of V2X sidelink communication is configured to perform V2X sidelink communication and can only use pre-configuration while not camping on a frequency, the UE may consider the frequency providing inter-carrier V2X sidelink configuration to be the highest priority. If the UE is configured to perform both V2X sidelink communication and NR sidelink communication, the UE may consider the frequency providing both V2X sidelink communication and NR sidelink communication configuration to be the highest priority.If the UE is configured to perform only V2X sidelink communication, the UE may consider the frequency providing V2X sidelink communication configuration to be the highest priority. If the UE is configured to perform only NR sidelink communication, the UE may consider the frequency providing NR sidelink communication configuration to be the highest priority. If the UE capable of sidelink discovery is configured to perform Public Safety related sidelink discovery and can only perform the Public Safety related sidelink discovery while camping on a frequency, the UE may consider that frequency to be the highest priority.

NOTE 1: The prioritization among the frequencies which UE considers to be the highest priority frequency is left to UE implementation.

NOTE 1a: The frequency only providing the anchor frequency configuration should not be prioritized for V2X service during cell reselection as specified in TS 36.331[3].

NOTE 1b: When UE is configured to perform NR sidelink communication or V2X sidelink communication performs cell reselection, it may consider the frequencies providing the intra-carrier and inter-carrier configuration have equal priority in cell reselection.

NOTE 1c: The UE is configured to perform V2X sidelink communication or NR sidelink communication, if it has the capability and is authorized for the corresponding sidelink operation.

NOTE 1d: When UE is configured to perform both NR sidelink communication and V2X sidelink communication, but cannot find a frequency which can provide both NR sidelink communication configuration and V2X sidelink communication configuration, UE may consider the frequency providing either NR sidelink communication configuration or V2X sidelink communication configuration to be the highest priority.

If the UE is capable either of MBMS Service Continuity or of SC-PTM reception and is receiving or interested to receive an MBMS service and can only receive this MBMS service while camping on a frequency on which it is provided, the UE may consider that frequency to be the highest priority during the MBMS session TS 36.300 [2] as long as the two following conditions are fulfilled:

1) Either:

- the UE is capable of MBMS service continuity and the reselected cell is broadcasting SIB13; or

- the UE is capable of SC-PTM reception and the reselected cell is broadcasting SIB20;

2) Either:

- SIB15 of the serving cell indicates for that frequency one or more MBMS SAIs included and associated with that frequency in the MBMS User Service Description (USD) TS 26.346 [22] of this service; or

- SIB15 is not broadcast in the serving cell and that frequency is included in the USD of this service.

If the UE is capable either of MBMS Service Continuity or of SC-PTM reception and is receiving or interested to receive an MBMS service provided on a downlink only MBMS frequency, on a frequency used by dedicated MBMS cells, on a frequency used by FeMBMS/Unicast-mixed cells as defined in TS 36.300 [2], or on a frequency belonging to PLMN different from its registered PLMN, the UE may consider cell reselection candidate frequencies at which it can not receive the MBMS service to be of the lowest priority during the MBMS session TS 36.300 [2], as long as the above mentioned condition 1) is fulfilled for the cell on the MBMS frequency which the UE monitors or this cell broadcasts SIB1-MBMS and as long as the above mentioned condition 2) is fulfilled for the serving cell.

NOTE 2: Example scenarios in which the previous down-prioritisation may be needed concerns the cases where camping is not possible, while the UE can only receive this MBMS frequency when camping on a subset of cell reselection candidate frequencies, e.g. the MBMS frequency is a downlink only carrier, the MBMS frequency is used by dedicated MBMS cells, the MBMS frequency is used by FeMBMS/Unicast-mixed cells TS 36.300 [2], or the MBMS frequency belongs to a PLMN different from UE's registered PLMN.

If the UE is not capable of MBMS Service Continuity but has knowledge on which frequency an MBMS service of interest is provided, it may consider that frequency to be the highest priority during the MBMS session TS 36.300 [2] as long as the reselected cell is broadcasting SIB13.

If the UE is not capable of MBMS Service Continuity but has knowledge on which downlink only frequency, on which frequency used by dedicated MBMS cells, on which frequency used by FeMBMS/Unicast-mixed cells as defined in TS 36.300 [2] or on which frequency belonging to PLMN different from its registered PLMN an MBMS service of interest is provided, it may consider cell reselection candidate frequencies at which it can not receive the MBMS service to be of the lowest priority during the MBMS session TS 36.300 [2] as long as the cell on the MBMS frequency which the UE monitors is broadcasting SIB13 or SIB1-MBMS.

NOTE 3: The UE considers that the MBMS session is ongoing using the session start and end times as provided by upper layers in the USD i.e. the UE does not verify if the session is indicated on MCCH.

In case UE receives *RRCConnectionReject* with *deprioritisationReq*, UE shall consider current carrier frequency and stored frequencies due to the previously received *RRCConnectionReject* with *deprioritisationReq* or all the frequencies of EUTRA to be the lowest priority frequency (i.e. lower than any of the network configured values) while T325 is running irrespective of camped RAT. The UE shall delete the stored deprioritisation request(s) when a PLMN selection is performed on request by NAS TS 23.122 [5].

NOTE 4: Connecting to CDMA2000 does not imply PLMN selection.

NOTE 5: UE should search for a higher priority layer for cell reselection as soon as possible after the change of priority. The minimum related performance requirements specified in TS 36.133 [10] are still applicable.

The UE shall delete priorities provided by dedicated signalling when:

- the UE enters a different RRC state; or

- the optional validity time of dedicated priorities (T320) expires; or

- a PLMN selection is performed on request by NAS TS 23.122 [5].

NOTE 6: Equal priorities between RATs are not supported.

The UE shall only perform cell reselection evaluation for E-UTRAN frequencies and inter-RAT frequencies that are given in system information and for which the UE has a priority provided.

In case the UE receives *RRCConnectionRelease* with *altFreqPriorities*, the UE shall consider the alternative cell reselection priorities broadcasted via *altCellReselectionPriority* and *altCellReselectionSubPriority* in the system information instead of priorities broadcasted via *cellReselectionPriority* and *cellReselectionSubPriority.* If the UE receives *RRCConnectionRelease* with *altFreqPriorities* and the alternative cell reselection priorities are not broadcasted via *altCellReselectionPriority* and *altCellReselectionSubPriority* in the system information, then the UE shall consider priorities broadcasted via *cellReselectionPriority* and *cellReselectionSubPriority.*

The UE shall not consider any black listed cells as candidate for cell reselection.

The UE shall inherit the priorities provided by dedicated signalling and the remaining validity time (i.e., T320 in E-UTRA and NR, T322 in UTRA and T3230 in GERAN), if configured, at inter-RAT cell (re)selection.

NOTE 7: The network may assign dedicated cell reselection priorities for frequencies not configured by system information.

While T360 is running, redistribution target is considered to be the highest priority (i.e. higher than any of the network configured values). UE shall continue to consider the serving frequency as the highest priority until completion of E-UTRAN Inter-frequency Redistribution procedure specified in 5.2.4.10 if triggered on T360 expiry/ stop.