**3GPP TSG-RAN WG2**  **Meeting #119e R2-2208734**

**e-Meeting, 17-26 August 2022**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.304** | **CR** | 0280 | **rev** | **1** | **Current version:** | **17.1.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Cell reselection corrections to RAN slicing | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated, Samsung | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_slice-Core | | | | |  | ***Date:*** | | | 2022-08-24 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. In RAN2#118-e meeting, RAN2 has the following agreement:   * In the case of a frequency with different slice-based frequency priorities in multiple slices/slice groups with the same slice group priority, the highest slice-based cell reselection priority is applied to this frequency.   However, the wording “**highest**” in this agreement was not correctly reflected in the slice-based cell reselection rules in TS 38.304, which results to the UE being confused about which priority to use during cell reselection procedure in this case.  In the third rule, it should be corrected as “*Among the frequencies (one or multiple) that support the highest prioritised NSAG(s) with the same NAS-provided priorities, the frequencies are prioritized in the order of their* ***highest*** *nsag-CellReselectionPriority given for these NSAG(s)*”.  An example is shared here to show how it works, the NSAG#1 and NSAG#2 are both supported in F1, and they have the same NSAG priority provided by NAS, the NSAG specific cell reselection priority as shown in the following table:   |  |  |  | | --- | --- | --- | | NSAG | frequency | NSAG specific cell reselection priority | | NSAG#1 | F1 | 6 | | NSAG#2 | F1 | 4 |   Thus, the highest slice-based cell reselection priority (i.e. 6) should be applied to F1 following the above agreements.  2. Current specification distinguishes to use the terms 'best cell' and 'highest ranked cell' i.e. the highest ranked cell refers to the cell fulfilling cell reselection criteria specified in clause 5.2.4.6 while the best cell refers to the cell according to absolute priority reselection criteria specified in clause 5.2.4.5. In other words, the best cell may not be the same as the highest ranked cell in some scenarios.  3. The frequency priority re-sorting when the best cell does not support the highest priority NSAG of the frequency is only reflected to inter-frequency with different priorities, but not for intra-freuency and inter-frequency with equal priorities.  4. In section 5.2.4.11, The fourth bullet is only supposed to be describing how to prioritize frequencies described in the third bullet with no nsag-CellReselectionPriority, should be merged with the third bullet to improve the wording.  5. In section 5.2.4.11, it is not correct that the slice-based cell reselection only considers valid TAI in current TA. Instead, UE should consider the NSAG+TAI pair available in serving cell and neighboring cells.  6. Current specification mentions that if the best cell doesn’t support any prioritized NSAG, UE re-derives the priority based on the NSAGs supported by the best cell. However in case the best cell doesn’t support any prioritized NSAG, the UE behavior is unclear. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Correction in clause 5.2.4.11 to reflect the agreements that the highest slice-based cell reselection priority is applied to this frequency in the case of a frequency with different slice-based frequency priorities in multiple slices/slice groups with the same slice group priority.  2. Clarify that the UE behavior of re-deriving reselection priority specified in clause 5.2.4.5 is also applicable to the highest ranked cell.  3. Clarify the frequency priority re-sorting when the best cell does not support the highest priority NSAG of the frequency should be applied to all frequencies.  4. Add text to the third bullet and remove the fourth bullet to clarify how to prioritize frequencies with no nsag-CellReselectionPriority for the highest prioritized NSAG.  5. Clarify UE should consider the NSAG+TAI pair for slice-based cell reselection, not limited to current TAI.  6. Clarify if the best cell or highest ranked cell in a frequency doesn’t support any prioritized NSAG, UE shall re-derive a re-selection priority of the frequency as if none of the NSAG(s) provided by NAS are supported.  **Impact analysis**  Impacted 5G architecture options:  NR SA  Impacted functionality:  slice-based cell reselection  Inter-operability:  The changes only impact UE, there is no inter-operability issue. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Slice-based cell reselection is incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.4.5, 5.2.4.11 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

----------------------------------------------------------------Start of change-------------------------------------------------------------

#### 5.2.4.5 NR Inter-frequency and inter-RAT Cell Reselection criteria

If *threshServingLowQ* is broadcast in system information and more than 1 second has elapsed since the UE camped on the current serving cell, cell reselection to a cell on a higher priority NR frequency or inter-RAT frequency than the serving frequency shall be performed if:

- A cell of a higher priority NR or EUTRAN RAT/frequency fulfils Squal > ThreshX, HighQ during a time interval TreselectionRAT

Otherwise, cell reselection to a cell on a higher priority NR frequency or inter-RAT frequency than the serving frequency shall be performed if:

- A cell of a higher priority RAT/ frequency fulfils Srxlev > ThreshX, HighP during a time interval TreselectionRAT; and

- More than 1 second has elapsed since the UE camped on the current serving cell.

Cell reselection to a cell on an equal priority NR frequency shall be based on ranking for intra-frequency cell reselection as defined in clause 5.2.4.6.

If *threshServingLowQ* is broadcast in system information and more than 1 second has elapsed since the UE camped on the current serving cell, cell reselection to a cell on a lower priority NR frequency or inter-RAT frequency than the serving frequency shall be performed if:

- The serving cell fulfils Squal < ThreshServing, LowQ and a cell of a lower priority NR or E-UTRAN RAT/ frequency fulfils Squal > ThreshX, LowQ during a time interval TreselectionRAT.

Otherwise, cell reselection to a cell on a lower priority NR frequency or inter-RAT frequency than the serving frequency shall be performed if:

- The serving cell fulfils Srxlev < ThreshServing, LowP and a cell of a lower priority RAT/ frequency fulfils Srxlev > ThreshX, LowP during a time interval TreselectionRAT; and

- More than 1 second has elapsed since the UE camped on the current serving cell.

Cell reselection to a higher priority RAT/frequency shall take precedence over a lower priority RAT/frequency if multiple cells of different priorities fulfil the cell reselection criteria.

If more than one cell meets the above criteria, the UE shall reselect a cell as follows:

- If the highest-priority frequency is an NR frequency, the highest ranked cell among the cells on the highest priority frequency(ies) meeting the criteria according to clause 5.2.4.6;

- If the highest-priority frequency is from another RAT, the strongest cell among the cells on the highest priority frequency(ies) meeting the criteria of that RAT.

------------------------------------------------------------------Next change---------------------------------------------------------------

5.2.4.11 Reselection priorities for slice-based cell reselection

The UE derives reselection priorities for slice-based cell reselection by using:

- NSAGs and their priorities provided by NAS,

- *sliceInfoList* and or *sliceInfoListDedicated* per frequency with *nsag-CellReselectionPriority* per NSAG, if provided in system information and/or dedicated signalling,

- *cellReselectionPriority* per frequency provided in system information and/or dedicated signalling.

The UE considers an NR frequency to support all slices of an NSAG if

- the corresponding *nsag-ID* is indicated for the NR frequency and valid for the concerned TA (current TA or indicated by *trackingAreaCode-r17*).

The UE considers a cell on an NR frequency to support all slices of an NSAG if

*-* thecorresponding *nsag-ID* is indicated for the NR frequency and valid for the concerned TA (current TA or indicated by *trackingAreaCode-r17*); and

- the cell is either listed in the *sliceAllowedCellListNR* (if provided in the used slice-based cell reselection information) or the cell is not listed in the *sliceExcludedCellListNR* (if provided in the used slice-based cell reselection information); or

- Neither *sliceAllowedCellListNR* nor *sliceExcludedCellListNR* is configured in the used slice-based cell reselection information

The UE shall derive reselection priorities for slice-based cell reselection according to the following rules:

- Frequencies that support at least one prioritized NSAG received from NAS have higher reselection priority than frequencies that support none of the NSAG(s) received from NAS.

- Frequencies that support at least one NSAG provided by NAS are prioritised in the order of the NAS-provided priority for the NSAG with highest priority supported on the frequency.

- Among the frequencies (one or multiple) that support the highest prioritised NSAG(s) with the same NAS-provided priorities, the frequencies are prioritized in the order of their highest *nsag-CellReselectionPriority* given for these NSAG(s). If no nsag-CellReselectionPriority is given for a NSAG at a frequency, the lowest priority value is used (i.e., lower than any of the network configured values for these frequencies).

- Frequencies that support none of the NSAG(s) provided by NAS are prioritized in the order of their *cellReselectionPriority*;

For a UE performing slice-based cell reselection, if the highest ranked cell or best cell in a frequency fulfils the inter- freqeuency cell reselection criteria (see clause 5.2.4.5) based on reselection priority for the frequency and NSAG derived according to this clause or fulfils intra-frequency and equal priority inter-frequency cell reselection criteria (see clause 5.2.4.6), but this cell does not support the NSAG according to this clause,

- if this cell supports any other NSAG(s) according to this clause, the UE shall re-derive a reselection priority for the frequency by considering the NSAG(s) supported by this cell (rather than those of the corresponding NR frequency);

- Otherwise, the UE shall re-derive a reselection priority for the frequency as if none of the NSAG(s) provided by NAS is supported.

This re-derived reselection priority is used for a maximum of 300 seconds, or until new information of NSAG(s) and their priorities are received from NAS. UE shall ensure the cell reselection criteria above are fulfilled based on the newly derived priorities.

------------------------------------------------------------------End of change-------------------------------------------------------------