**3GPP TSG-RAN WG2 Meeting #128 *R2-241xxxx***

**Orlando, USA, 18 - 22 November 2024**

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.321** | **CR** | **1969** | **rev** | **2** | **Current version:** | **18.3.0** |  |
|  |
| *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 | **X** | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | Correction to LTM MAC CE based CFRA with MSG1 repetition |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_Mob\_enh2-Core, NR\_cov\_enh2-Core, NR\_redcap-Core, NR\_redcap\_enh-Core |  | ***Date:*** | 2024-11-18 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | When contention-free random access resources have been provided, the UE needs to select a set of random access resources, in order to have a right parameters initialization (e.g. RACH-ConfigCommon) for CFRA and als to enable CFRA-to-CBRA fallback, as specified in TS 38.321, clause 5.1.1b, without parameter re-initialization. Hence when providing the CFRA resource, the restriction on same repetition number with CBRA is the prerequition for CFRA configuration. For RRC based CFRA, configuration restrictions in *rach-ConfigDedicated* are defined separately for non-(e)RedCap UEs, Redcap UEs and eRedCap UEs and the (e)RedCap UEs needs to additionally consider the restriction on (e)RedCap indication with same repetition number as below:

|  |  |
| --- | --- |
| *4StepCFRArep* | For non-(e)RedCap UEs, the field is optionally present, Need S, if *resources* is set to *ssb* and there is one *FeatureCombinationPreambles* entry indicating only *msg1-Repetitions* which is associated with the same Msg1 repetition number.For RedCap UEs or if RedCap is considered to be applicable for this Random Access procedure for eRedCap UEs, the field is optionally present, Need S, if *resources* is set to *ssb* and there is one *FeatureCombinationPreambles* entry indicating only *redCap* and *msg1-Repetitions* which is associated with the same Msg1 repetition number.For eRedCap UEs, if eRedCap is considered to be applicable for this Random Access procedure, the field is optional present, Need S, if *resource* is set to *ssb* and there is one *FeatureCombinationPreambles* entry indicating only *eRedCap* and *msg1-Repetitions* which is associated with the same Msg1 repetition number.Otherwise, it is absent. |

In LTM with MSG1 repetition, MAC CE based CFRA with MSG1 repetition introduced. To enable right parameters initialization and fallback for all UE types also in LTM CFRA with MSG1 repetition case, **MAC CE based CFRA should have similar configuration restriction as RRC based CFRA**. In TS 38.321, a note for configuration restriction is added but it is only for a non-(e)RedCap UEs.

|  |
| --- |
| NOTE 1: A non-zero Msg1 repetition number value may only be included in the LTM Cell Switch Command MAC CE when the LTM target cell configuration has contention-based Random Access Resources with a *FeatureCombinationPreambles* with the same Msg1 repetition number value and *featureCombination* indicating only *msg1-Repetitions*. |

The Configuration restiction for the (e)RedCap UEs is missing somewhere in TS 38.321. For (e)RedCap UEs, the (e)Redcap indication needs to be included additionally with same repetition number restriction for MAC CE based CFRA, similarly as RRC based CFRA. Hence a MAC clarification is needed.In MAC specification, “Redcap is considerred to be applicable for random access procedure” can conrrespond to both RedCap UEs and eRedcap UEs who consider itself as Redcap UEs due to there is no RA partition in RRC configuration associated with eRedcap indication. Hence we want to have a simplfiled wording.  |
|  |  |
| ***Summary of change:*** | In the existing note, capture the case of non-(e)RedCap UEs, RedCap UEs and eRedCapUEs.**Impact analysis**5G impacted architecturesNR standalone, (NG)EN-DC, NR-DC, NE-DC Impacted functionality:LTM, (e)RedCap, coverage enhancement, RACH partitioningInter-operability:If the UE is implemented according to this CR but the network is not, the UE may select a wrong set of RACH resources and the RACH procedure may fail.If the network is implemented according to this CR but the UE is not, there is no inter-operability issue. |
|  |  |
| ***Consequences if not approved:*** | At LTM cell switch with RACH using msg1 repetition, the UE may select a wrong set of RACH resources and the RACH procedure may fail. |
|  |  |
| ***Clauses affected:*** | 6.1.3.75 |
|  |  |
|  | **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

#### 6.1.3.75 LTM Cell Switch Command MAC CE

The LTM Cell Switch Command MAC CE is identified by MAC subheader with eLCID as specified in Table 6.2.1-1b. It has a variable size with following fields (Figure 6.1.3.75-1):

- R: Reserved bit, set to 0;

- Target Configuration ID: This field indicates the index of candidate target configuration to apply for LTM cell switch, corresponding to *ltm-CandidateId* minus 1as specified in TS 38.331 [5]. The length of the field is 3 bits;

- Timing Advance Command: This field indicates whether the TA is valid for the LTM target cell (i.e. the SpCell corresponding to the target configuration indicated by Target Configuration ID field). If the value of this field is set to FFF, this field indicates that no valid timing adjustment is available for the PTAG of the LTM target cell; otherwise, this field indicates the index value *TA* used to control the amount of timing adjustment that the MAC entity has to apply in TS 38.213 [6], and that the UE can skip the Random Access procedure for this LTM cell switch. If *tag-Id-ptr* is configured for the TCI state indicated by the UL TCI state ID field, if present, or by the TCI state ID field otherwise, in the LTM target cell and *tag-Id-ptr* is set to value *n1*, this field indicates the TA for the TAG indicated by the *tag2-Id* of the LTM target cell; otherwise, this field indicates the TA for the TAG indicated by the *tag-id* of the LTM target cell. The length of the field is 12 bits;

- TCI state ID: This field indicates and activates the TCI state for the LTM target cell (i.e. the SpCell of the target configuration indicated by the Target Configuration ID field). The TCI state is identified by *TCI-StateId* in *ltm-DL-OrJointTCI-StateToAddModList* as specified in TS 38.331 [5]. If the value of *unifiedTCI-StateType* in the *ltm-TCI-Info* of the configuration indicated by Target Configuration ID fieldis *joint*, this field is for joint TCI state, otherwise, this field is for downlink TCI state. The length of the field is 7 bits;

- UL TCI state ID: This field indicates and activates the uplink TCI state for the LTM target cell (i.e. the SpCell of the target configuration indicated by the Target Configuration ID field). The UL TCI state is identified by *TCI-UL-StateId* in *ltm-UL-TCI-StateToAddModList* as specified in TS 38.331 [5]. The octet containing this field (i.e. this field and the two reserved bits in the same octet) is included if the value of *unifiedTCI-StateType* in the *ltm-TCI-Info* of the configuration indicated by Target Configuration ID fieldis *separate*. The length of the field is 6 bits;

- C: This field indicates the presence of the contention-free Random Access Resources fields. If the value of this field is set to 1, the following fields are present: Random Access Preamble index field, S/U field, SS/PBCH index field, PRACH Mask index field, Repetition number field and the reserved bits in the same octet. If the value of this field is set to 0, these fields are absent.

- S/U: This field indicates which UL carrier to transmit the PRACH of the contention-free Random Access Resources. If the value of this field is set to 1, SUL is used; otherwise, NUL is used. The length of the field is 1 bit;

- Random Access Preamble index: This field indicates the Random Access Preamble index of the contention-free Random Access Resources. This field should not be set to 0b000000. The length of the field is 6 bits;

- SS/PBCH index: This field indicates the SS/PBCH that shall be used to determine the RACH occasion for the PRACH transmission of the contention-free Random Access Resources. The length of the field is 6 bits;

- PRACH Mask index: This field indicates the RACH occasion(s) associated with the SS/PBCH indicated by 'SS/PBCH index' for the PRACH transmission of the contention-free Random Access Resources. It indicates a subset of RACH occasion(s) from the *rach-ConfigDedicated* for the UL carrier (indicated by S/U field), (if provided, otherwise it indicates a subset of RACH occasion(s) from the *rach-ConfigCommon* for the UL carrier (indicated by S/U field) in the UL BWP configuration of *firstActiveUplinkBWP-Id* as specified in TS 38.331 [5]. When the repetition number field is not set to 0, the UE ignores this field. The length of the field is 4 bits;

- Repetition number: This field indicates the Msg1 repetition number to be applied to the contention-free Random Access. If this field is set to 0, Msg1 repetition number does not apply. If this field is set to 1, the Msg1 repetition number is 2. If this field is set to 2, the Msg1 repetition number is 4. If this field is set to 3, the Msg1 repetition number is 8. The length of the field is 2 bits.

NOTE 1: A non-zero Msg1 repetition number value may only be included in the LTM Cell Switch Command MAC CE when the LTM target cell configuration has contention-based Random Access Resources with a *FeatureCombinationPreambles* with the same Msg1 repetition number value and, for non (e)RedCap UEs, *featureCombination* indicating only *msg1-Repetitions*, for RedCap UEs, *featureCombination* indicating only *msg1-Repetitions* and RedCap indication, for eRedCap UEs, *featureCombination* indicating only *msg1-Repetitions* and eRedCap indication.



Figure 6.1.3.75-1: LTM Cell Switch Command MAC CE

NOTE 2: If UE receives the LTM Cell Switch Command MAC CE with a Target Configuration ID value not matching any configured *ltm-CandidateId* minus 1, as specified in TS 38.331 [5], the procedue of handling LTM Cell Switch Command MAC CE in clause 5.18.35 does not apply.

End of Change