**3GPP TSG-RAN WG2 Meeting #127 *R2-240xxxxx***

**Maastricht, Netherlands, Aug 19 – 23, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **38.321** | **CR** | **1885** | **rev** | **1** | **Current version:** | **18.2.0** |  |
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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:***  | Correction on RACH resource set selection---Option 1 |
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| ***Source to WG:*** | ZTE Corporation |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | NR\_cov\_enh2-Core, NR\_MIMO\_evo\_DL\_UL-Core, NR\_Mob\_enh2-Core, NR\_redcap\_enh-Core |  | ***Date:*** | 2024-08-09 |
|  |  |  |  |  |
| ***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)* |
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| ***Reason for change:*** | As observed in R2-2406412, in current MAC spec, the RACH resource set selection procedure has two problems:1. By introducing Rel-18 Msg1 repetition, eRedCap, LTM, 2TA operation, the text procedure becomes more and more complex, and the text structure becomes confusing, it makes the spec less readable and difficult for future extension.
2. For RedCap and eRedCap UEs, if CFRA is triggered by PDCCH order, there is conflict processing for RACH resource set selection. Based on the current text procedure, when network triggers secondary TA acquisition or LTM early RACH, the UE will select the common RACH resource set that associated with at least RedCap indication, but not the pre-configured dedicated RACH resource that associated with the indicated PCI.

The CR is provided to address the above problems.  |
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| ***Summary of change:*** | 1. Reformulate the text procedure in clause 5.1.1b.

**Impact analysis**Impacted 5G architecture options:NR SA, (NG)EN-DC, NR-DC, NE-DCImpacted functionality:RACH resource set selection for CFRA, SI requestInter-operability:# For (e)RedCap UE and PDCCH order based CFRA is triggered for secondary TA aquisition or LTM early RACH:* If the network is implemented according to the CR and the UE is not, the UE will select the RACH resource not associated with indicated PCI and cause RACH failure;
* If the UE is implemented according to the CR and the network is not, there is no inter-operability issue.

# For other cases:* If the network is implemented according to the CR and the UE is not, or If the UE is implemented according to the CR and the network is not, there is no inter-operability issue.
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| ***Consequences if not approved:*** | 1. The text procedure for RACH resource set selection is confusing.
2. For RedCap and eRedCap UEs, when network triggers PDCCH order to request UE to perform secondary TA acquisition or LTM early RACH, the UE will select the wrong RACH resource instead of preconfigured dedicated RACH associated the indicated PCI.

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| ***Clauses affected:*** | 5.1.1b |
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|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

***Start of change***

### 5.1.1b Selection of the set of Random Access resources for the Random Access procedure

The MAC entity shall:

1> if the BWP selected for Random Access procedure is configured with both set(s) of Random Access resources with *msg3-Repetitions* set to *true* and set(s) of Random Access resources without *msg3-Repetitions* set to *true* and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg3*; or

1> if the BWP selected for Random Access procedure is only configured with the set(s) of Random Access resources with *msg3-Repetitions* set to *true*:

2> assume Msg3 repetition is applicable for the current Random Access procedure.

1> else:

2> assume Msg3 repetition is not applicable for the current Random Access procedure.

1> if contention-free Random Access Resources have been provided for this Random Access procedure in the LTM Cell Switch Command MAC CE and a non-zero Msg1 repetition number is indicated in the LTM Cell Switch Command MAC CE:

2> assume that Msg1 repetition is applicable and that the Msg1 repetition number applicable for the current Random Access procedure is the Msg1 repetition number indicated in the LTM Cell Switch Command MAC CE.

1> else if contention-free Random Access Resources have been provided for this Random Access procedure and a Msg1 repetition number is indicated in *rach-ConfigDedicated*:

2> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure is the Msg1 repetition number indicated in *rach-ConfigDedicated*.

1> else if contention free Random Access Resources have not been provided for this Random Access procedure and the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources with *msg1-Repetitions* set to *true* and set(s) of Random Access resources without *msg1-Repetitions* set to *true*:

2> if the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources associated with Msg1 repetition number 8 and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum8*:

3> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure includes 8.

2> if the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources associated with Msg1 repetition number 4 and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum4*:

3> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure includes 4.

2> if the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources associated with Msg1 repetition number 2 and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum2*:

3> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure includes 2.

2> else if the RSRP of the downlink pathloss reference is not less than any configured *rsrp-ThresholdMsg1-RepetitionNumX*:

3> assume Msg1 repetition is not applicable for the current Random Access procedure.

1> else ifthe BWP selected for Random Access procedure is configured only with Random Access resources with *msg1-Repetitions* set to *true*:

2> assume Msg1 repetition is applicable for the current Random Access procedure;

2> if at least one of *rsrp-ThresholdMsg1-RepetitionNumX* is configured:

3> if *rsrp-ThresholdMsg1-RepetitionNum8* is configured and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum8*;

4> assume Msg1 repetition number applicable for the current Random Access procedure includes 8.

3> if *rsrp-ThresholdMsg1-RepetitionNum4* is configured and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum4*:

4> assume Msg1 repetition number applicable for the current Random Access procedure includes 4.

3> if *rsrp-ThresholdMsg1-RepetitionNum2* is configured and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum2*:

4> assume Msg1 repetition number applicable for the current Random Access procedure includes 2.

3> else if the RSRP of the downlink pathloss reference is not less than any configured *rsrp-ThresholdMsg1-RepetitionNumX*:

4> assume Msg1 repetition number applicable for the current Random Access procedure is the lowest Msg1 repetition number configured for this BWP.

2> else (none of *rsrp-ThresholdMsg1-RepetitionNumX* is configured):

3> assume Msg1 repetition number applicable for the current Random Access procedure is the Msg1 repetition number that configured for this BWP.

NOTE 1: Void.

1> if neither contention-free Random Access Resources nor Random Access Resources for SI request have been provided for this Random Access procedure and one or more of the features including (e)RedCap and/or Slicing and/or SDT and/or MSG3 repetition and/or MSG1 repetition is applicable for this Random Access procedure:

NOTE 2: The applicability of SDT is determined by MAC entity according to clause 5.27. The applicability of *NSAG-ID* is determined by upper layers when the Random Access procedure is initiated. The applicability of (e)RedCap is also determined by upper layers when Random Access procedure is initiated and it is applicable to the Random Access procedures initiated by PDCCH orders and any Random Access procedure initiated by the MAC entity.

NOTE 3: SDT is not applicable for the Random Access procedure initiated by upper layers for MT-SDT.

2> if none of the sets of Random Access resources are available for any feature applicable to the current Random Access procedure (as specified in clause 5.1.1c):

3> select the set(s) of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

2> else if there is one set of Random Access resources available which can be used for indicating all features triggering this Random Access procedure:

3> select this set of Random Access resources for this Random Access procedure.

2> else if there are more than one set of Random Access resources available which can be used for indicating all features triggering this Random Access procedure and Msg1 repetition is applicable for this Random Access procedure:

3> select the set of Random Access resources that associated with highest repetition number among the sets of Random Access resources.

2> else (i.e. there are one or more sets of Random Access resources available that are configured with indication(s) for a subset of all features triggering this Random Access procedure):

3> select a set of Random Access resources from the available set(s) of Random Access resources based on the priority order indicated by upper layers as specified in clause 5.1.1d for this Random Access Procedure.

1> else if the Random Access procedure is initiated by PDCCH order with DCI *PRACH association indicator* field set to 1 and *SSB-MTC-AdditionalPCI* is configured by upper layers, as specified in clause 7.3.1.2.1 of TS 38.212 [9]:

2> select the set of Random Access resources corresponding to the *additionalPCI* associated with active TCI states.

1> else if the Random Access procedure is initiated by PDCCH order for an LTM candidate cell:

2> select the set of Random Access resources corresponding to the field *Cell indicator* in PDCCH order.

1> else if contention-free Random Access Resources have been provided for this Random Access procedure in the LTM Cell Switch Command MAC CE:

2> if RedCap is applicable for the current Random Access procedure:

3> if a non-zero Msg1 repetition number is indicated in the LTM Cell Switch Command MAC CE:

4> select the set of Random Access resources that is only configured with RedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

3> else:

4> if there is one set of Random Access resources available that is only configured with RedCap indication:

5> select this set of Random Access resources for this Random Access procedure.

4> else:

5> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

2> else if eRedCap is applicable for the current Random Access procedure:

3> if a non-zero Msg1 repetition number is indicated in the LTM Cell Switch Command MAC CE:

4> select the set of Random Access resources that is only configured with eRedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

3> else:

4> if there is one set of Random Access resources available that is only configured with eRedCap indication:

5> select this set of Random Access resources for this Random Access procedure.

4> else if there is one set of Random Access resources available that is only configured with RedCap indication:

5> select this set of Random Access resources for this Random Access procedure.

4> else:

5> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

2> else:

3> if a non-zero Msg1 repetition number is indicated in the LTM Cell Switch Command MAC CE:

4> select the set of Random Access resources that is only configured with Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

3> else:

4> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

1> else if contention-free Random Access Resources have been provided for this Random Access procedure in *rach-ConfigDedicated*:

2> if RedCap is applicable for the current Random Access procedure:

3> if Msg1 repetition number is indicated in *rach-ConfigDedicated*:

4> select the set of Random Access resources that is only configured with RedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

3> else:

4> if there is one set of Random Access resources available that is only configured with RedCap indication:

5> select this set of Random Access resources for this Random Access procedure.

4> else:

5> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for the current Random Access procedure.

2> else if eRedCap is applicable for the current Random Access procedure:

3> if Msg1 repetition number is indicated in *rach-ConfigDedicated*:

4> select the set of Random Access resources that is only configured with eRedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

3> else:

4> if there is one set of Random Access resources available that is only configured with eRedCap indication:

5> select this set of Random Access resources for this Random Access procedure.

4> else if there is one set of Random Access resources available that is only configured with RedCap indication:

5> select this set of Random Access resources for this Random Access procedure.

4> else:

5> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for the current Random Access procedure.

2> else:

3> if Msg1 repetition number is indicated in *rach-ConfigDedicated*:

3> select the set of Random Access resources that is only configured with Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

3> else:

5> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

1> else if the Random Access procedure is initiated by PDCCH order with *ra-PreambleIndex* different from 0b000000:

2> if RedCap is applicable for the current Random Access procedure:

3> if there is one set of Random Access resources available that is only configured with RedCap indication:

4> select this set of Random Access resources for this Random Access procedure.

3> else:

4> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

2> else if eRedCap is applicable for the current Random Access procedure:

3> if there is one set of Random Access resources available that is only configured with eRedCap indication:

4> select this set of Random Access resources for this Random Access procedure.

3> else if there is one set of Random Access resources available that is only configured with RedCap indication:

4> select this set of Random Access resources for this Random Access procedure.

3> else:

4> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

2> else:

3> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

1> else if the Random Access procedure was initiated for SI request:

2> if Random Access Resources associated with Msg1 repetition for SI request and Msg1 repetition number have been provided for this Random Access procedure:

3> ifthe BWP selected for Random Access procedure is indicated by *initialUplinkBWP-RedCap*:

4> if RedCap is applicable for the current Random Access procedure:

5> select the set of Random Access Resources that is only configured with RedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

4> else if eRedCap is applicable for the current Random Access procedure:

5> if there is one set of Random Access resources available that is only configured with RedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number:

6> select this set of Random Access resources for this Random Access procedure.

5> else:

6> select the set of Random Access Resources that is only configured with eRedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number.

3> else:

4> select the set of Random Access resources that is only configured with Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

2> else:

3> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for the current Random Access procedure.

1> else:

2> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for the current Random Access procedure.