**3GPP TSG-RAN WG2 Meeting #126 *R2-2405833***

**Fukuoka, Japan, May 20 – 24, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.331** | **CR** | **4807** | **rev** | **1** | **Current version:** | **17.8.0** |  |
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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:*** | Clarification on RACH-ConfigCommon for PDCCH order based CFRA and SI request | | | | | | | | | |
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| ***Source to WG:*** | ZTE Corporation, Samsung | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_redcap-Core | | | | |  | ***Date:*** | | | 2024-05-10 |
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| ***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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | 1. In RAN2#125 meeting, companies discussed the ambiguity issue of which RACH-ConfigCommon is used for CFRA and agreed that for reconfigurationWithSync and BFR, the UE applies the RACH configuration according to the RACH resource set selection procedure specified in TS 38.32, and the below modification to FD is agreed.  |  | | --- | | ***rach-ConfigCommon***  Configuration of cell specific random access parameters which the UE uses for contention based and contention free random access as well as for contention based beam failure recovery in this BWP. The NW configures SSB-based RA (and hence *RACH-ConfigCommon*) only for UL BWPs if the linked DL BWPs (same *bwp-Id* as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or for RedCap UEs DL BWPs associated with *nonCellDefiningSSB* or the RedCap-specific initial downlink BWP. The network configures *rach-ConfigCommon* (without suffix) and/or *rach-ConfigCommon-r17*, whenever it configures contention free random access (for reconfiguration with sync or for beam failure recovery), the UE then applies the corresponding configuration depending on the RACH resource set selected upon RACH initialization, as specified in TS 38.321 [3]. For RedCap-specific initial uplink BWP, *rach-ConfigCommon* is always configured when *msgA-ConfigCommon* is configured in this BWP. |   However, for PDCCH-order based CFRA, the discussion was postponed due to no consensus.  In Rel-17 MAC spec as an example(see below), it says “if contention-free Random Access Resources have been provided”, it does not differentiate CFRA cases. So, it implies the same principle should be applied for all CFRA cases.   |  | | --- | | 5.1.1b Selection of the set of Random Access resources for the Random Access procedure  The MAC entity shall:  \*\*\*omit non-related part\*\*\*  1> else if contention-free Random Access Resources have been provided for this Random Access procedure and RedCap is applicable for the current Random Access procedure and there is one set of Random Access resources available that is only configured with RedCap indication:  2> select this set of Random Access resources for this 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. |   However, the RRC spec is unclear (because only reconfigurationWithSync and BFR are mentioned) and this may cause inter-operability issue if the gNB and the UE have different understandings.   1. In RAN2#125bis meeting, companies discussed the issue on which RACH-ConfigCommon should be used for SI-request when rach-OccasionsSI is NOT configured in corresponding SI-RequestConfig.   Similar to issue 1, the RACH resource selection procedure for SI request is specified in TS 38.321, in RRC spec, we can refer to MAC specification to avoid inter-operability issue. | | | | | | | | |
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| ***Summary of change:*** | | 1. In the field description of rach-ConfigCommon in BWP-UplinkConfig, to clarifity the principle on which RACH configuration should be applied is also applicable to PDCCH-order based CFRA case, update the bracket as “(e.g. for reconfiguration with sync or for beam failure recovery or PDCCH order)”; 2. In the field description of rach-OccasionsSI in SI-RequestConfig, to clarify that when the field is absent, the UE applies the RACH configuration associated with the selected RACH resources set, as specified in TS 38.321. The term “initial uplink BWP” in field description already covers both legacy initial uplink BWP and RedCap-specific initial uplink BWP.   **Impact analysis**  Impacted 5G architecture options:  NR SA, (NG)EN-DC, NR-DC, NE-DC  Impacted functionality:  PDCCH order based CFRA, Msg1 based SI request  Inter-operability:  #Change 1   * 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, the network and the UE may have different understandings on which RACH-ConfigCommon to be used in pdcch-order based CFRA, RACH failure may occur.   #Change 2   * 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, the network and the UE may have different understandings on which RACH-ConfigCommon to be used in Msg1 based SI request if rach-OccasionsSI is not configured, RACH failure may occur. | | | | | | | | |
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| ***Consequences if not approved:*** | | 1. When multiple RACH-ConfigCommon configurations are configured and pdcch-order based CFRA is triggered, it is unclear which RACH-ConfigCommon should be applied by the UE to trigger RACH procedure. 2. When rach-OccasionsSI is not configured for SI request and there are multiple RACH-ConfigCommon configured, it is unclear which RACH-ConfigCommon should be applied by the UE when triggering SI request.   This CR intends to align MAC specification and RRC specification. | | | | | | | | |
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| ***Clauses affected:*** | | 6.3.2 | | | | | | | | |
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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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

***Start of changes***

### 6.3.2 Radio resource control information elements

#### – *BWP-UplinkCommon*

The IE *BWP-UplinkCommon* is used to configure the common parameters of an uplink BWP. They are "cell specific" and the network ensures the necessary alignment with corresponding parameters of other UEs. The common parameters of the initial bandwidth part of the PCell are also provided via system information. For all other serving cells, the network provides the common parameters via dedicated signalling.

*BWP-UplinkCommon* information element

-- ASN1START

-- TAG-BWP-UPLINKCOMMON-START

BWP-UplinkCommon ::= SEQUENCE {

genericParameters BWP,

rach-ConfigCommon SetupRelease { RACH-ConfigCommon } OPTIONAL, -- Need M

pusch-ConfigCommon SetupRelease { PUSCH-ConfigCommon } OPTIONAL, -- Need M

pucch-ConfigCommon SetupRelease { PUCCH-ConfigCommon } OPTIONAL, -- Need M

...,

[[

rach-ConfigCommonIAB-r16 SetupRelease { RACH-ConfigCommon } OPTIONAL, -- Need M

useInterlacePUCCH-PUSCH-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

msgA-ConfigCommon-r16 SetupRelease { MsgA-ConfigCommon-r16 } OPTIONAL -- Cond SpCellOnly2

]],

[[

enableRA-PrioritizationForSlicing-r17 BOOLEAN OPTIONAL, -- Cond RA-PrioSliceAI

additionalRACH-ConfigList-r17 SetupRelease { AdditionalRACH-ConfigList-r17 } OPTIONAL, -- Cond SpCellOnly2

rsrp-ThresholdMsg3-r17 RSRP-Range OPTIONAL, -- Need R

numberOfMsg3-RepetitionsList-r17 SEQUENCE (SIZE (4)) OF NumberOfMsg3-Repetitions-r17 OPTIONAL, -- Cond Msg3Rep

mcs-Msg3-Repetitions-r17 SEQUENCE (SIZE (8)) OF INTEGER (0..31) OPTIONAL -- Cond Msg3Rep

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}

AdditionalRACH-ConfigList-r17 ::= SEQUENCE (SIZE(1..maxAdditionalRACH-r17)) OF AdditionalRACH-Config-r17

AdditionalRACH-Config-r17 ::= SEQUENCE {

rach-ConfigCommon-r17 RACH-ConfigCommon OPTIONAL, -- Need R

msgA-ConfigCommon-r17 MsgA-ConfigCommon-r16 OPTIONAL, -- Need R

...

}

NumberOfMsg3-Repetitions-r17::= ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16}

-- TAG-BWP-UPLINKCOMMON-STOP

-- ASN1STOP

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| *BWP-UplinkCommon* field descriptions |
| ***additionalRACH-ConfigList***  List of feature or feature combination-specific RACH configurations, i.e. the RACH configurations configured in addition to the one configured by *rach-ConfigCommon* and by *msgA-ConfigCommon*. The network associates all possible preambles of an additional RACH configuration to one or more feature(s) or feature combination(s). The network does not configure this list to have more than 16 entries. If both *rach-ConfigCommon* and *msgA-ConfigCommon* are configured for a specific *FeatureCombination*, the network always provides them in the same *additionalRACH-Config*. |
| ***enableRA-PrioritizationForSlicing***  Indicates whether or not the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep* should override the *ra-PrioritizationForAccessIdentity*. The field is applicable only when the UE is configured by upper layers with both NSAG and Access Identity 1 or 2. If value *TRUE* is configured, the UE should only apply the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep*. If value *FALSE* is configured, the UE should only apply *ra-PrioritizationForAccessIdentity*. If the field is absent, whether to use *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep* or *ra-PrioritizationForAccessIdentity* is up to UE implementation. |
| ***mcs-Msg3-Repetitions***  Configuration of eight candidate MCS indexes for PUSCH transmission scheduled by RAR UL grant and DCI format 0\_0 with CRC scrambled by TC-RNTI. Only the first 4 configured or default MCS indexes are used for PUSCH transmission scheduled by RAR UL grant. This field is only applicable when the UE selects Random Access resources indicating Msg3 repetition in this BWP. If this field is absent when the set(s) of Random Access resources with MSG3 repetition indication are configured in the *BWP-UplinkCommon*, the UE shall apply the values {0, 1, 2, 3, 4, 5, 6, 7} (see TS 38.214 [19], clause 6.1.4). |
| ***msgA-ConfigCommon***  Configuration of the cell specific PRACH and PUSCH resource parameters for transmission of MsgA in 2-step random access type procedure. The NW can configure *msgA-ConfigCommon* only for UL BWPs if the linked DL BWPs (same bwp-Id as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or for RedCap UEs DL BWPs associated with *nonCellDefiningSSB* or the RedCap-specific initial downlink BWP. |
| ***numberOfMsg3-RepetitionsList***  The number of repetitions for PUSCH transmission scheduled by RAR UL grant and DCI format 0\_0 with CRC scrambled by TC-RNTI. This field is only applicable when the UE selects Random Access resources indicating Msg3 repetition in this BWP. If this field is absent when the set(s) of Random Access resources with MSG3 repetition indication are configured in the *BWP-UplinkCommon*, the UE shall apply the values {n1, n2, n3, n4} (see TS 38.214 [19], clause 6.1.2.1). |
| ***pucch-ConfigCommon***  Cell specific parameters for the PUCCH of this BWP. |
| ***pusch-ConfigCommon***  Cell specific parameters for the PUSCH of this BWP. |
| ***rach-ConfigCommon***  Configuration of cell specific random access parameters which the UE uses for contention based and contention free random access as well as for contention based beam failure recovery in this BWP. The NW configures SSB-based RA (and hence *RACH-ConfigCommon*) only for UL BWPs if the linked DL BWPs (same *bwp-Id* as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or for RedCap UEs DL BWPs associated with *nonCellDefiningSSB* or the RedCap-specific initial downlink BWP. The network configures *rach-ConfigCommon* (without suffix) and/or *rach-ConfigCommon-r17*, whenever it configures contention free random access (e.g. for reconfiguration with sync or for beam failure recovery or PDCCH order), the UE then applies the corresponding configuration depending on the RACH resource set selected upon RACH initialization, as specified in TS 38.321 [3]. For RedCap-specific initial uplink BWP, *rach-ConfigCommon* is always configured when *msgA-ConfigCommon* is configured in this BWP. |
| ***rach-ConfigCommonIAB***  Configuration of cell specific random access parameters for the IAB-MT. The IAB specific IAB RACH configuration is used by IAB-MT, if configured. |
| ***rsrp-ThresholdMsg3***  Threshold used by the UE for determining whether to select resources indicating Msg3 repetition in this BWP, as specified in TS 38.321 [3]. The field is mandatory if both set(s) of Random Access resources with MSG3 repetition indication and set(s) of Random Access resources without MSG3 repetition indication are configured in the BWP. It is absent otherwise. |
| ***useInterlacePUCCH-PUSCH***  If the field is present, the UE uses uplink frequency domain resource allocation Type 2 for cell-specific PUSCH, e.g., PUSCH scheduled by RAR UL grant (see TS 38.213 [13] clause 8.3 and TS 38.214 [19], clause 6.1.2.2) and uses interlaced PUCCH Format 0 and 1 for cell-specific PUCCH (see TS 38.213 [13], clause 9.2.1). |

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| Conditional Presence | Explanation |
| *Msg3Rep* | This field is optionally present, Need S, if the set(s) of Random Access resources with MSG3 repetition indication are configured in the *BWP-UplinkCommon*. It is absent otherwise. |
| *RA-PrioSliceAI* | The field is optionally present in *SIB1*, Need R, if both parameters *ra-PrioritizationForAccessIdentity* and the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep* are present in *SIB1*. It is absent otherwise. |
| *SpCellOnly2* | The field is optionally present, Need M, in the *BWP-UplinkCommon* of an SpCell. It is absent otherwise. |

***Next change***

#### – *SI-RequestConfig*

The IE *SI-RequestConfig* contains configuration for Msg1 based SI request.

*SI-RequestConfig* information element

-- ASN1START

-- TAG-SI-REQUESTCONFIG-START

SI-RequestConfig ::= SEQUENCE {

rach-OccasionsSI SEQUENCE {

rach-ConfigSI RACH-ConfigGeneric,

ssb-perRACH-Occasion ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen}

} OPTIONAL, -- Need R

si-RequestPeriod ENUMERATED {one, two, four, six, eight, ten, twelve, sixteen} OPTIONAL, -- Need R

si-RequestResources SEQUENCE (SIZE (1..maxSI-Message)) OF SI-RequestResources

}

SI-RequestResources ::= SEQUENCE {

ra-PreambleStartIndex INTEGER (0..63),

ra-AssociationPeriodIndex INTEGER (0..15) OPTIONAL, -- Need R

ra-ssb-OccasionMaskIndex INTEGER (0..15) OPTIONAL -- Need R

}

-- TAG-SI-REQUESTCONFIG-STOP

-- ASN1STOP

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| *SI-RequestConfig* field descriptions |
| ***rach-OccasionsSI***  Configuration of dedicated RACH Occasions for SI. If the field is absent, the UE uses the corresponding parameters configured in *rach-ConfigCommon* corresponding to the RACH resource set selected upon RACH initialization (as specified in TS 38.321 [3]), of the initial uplink BWP. |
| ***si-RequestPeriod***  Periodicity of the *SI-Request* configuration in number of association periods. |
| ***si-RequestResources***  If there is only one entry in the list, the configuration is used for all SI messages for which *si-BroadcastStatus* or *posSI-BroadcastStatus* is set to *notBroadcasting*. Otherwise:  - If *si-SchedulingInfo-v1700* is not present and the *SI-RequestConfig* is used for on-demand SI request in *SI-SchedulingInfo* or *PosSI-SchedulingInfo*, the 1st entry in the list corresponds to the first SI message in *schedulingInfoList* or *posSchedulingInfoList* for which *si-BroadcastStatus* or *posSI-BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI message in *schedulingInfoList* or *posSchedulingInfoList* for which *si-BroadcastStatus* or *posSI-BroadcastStatus* is set to *notBroadcasting* and so on.  - If *si-SchedulingInfo-v1700* is present and *SI-RequestConfig* is configured in *SI-SchedulingInfo* for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type1 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* to the SI messagesconfigured by *schedulingInfoList* in *si-SchedulingInfo.* The 1st entry in the list corresponds to the first SI message for which *si-BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI messagefor which *si-BroadcastStatus* is set to *notBroadcasting* and so on.  - If *si-SchedulingInfo-v1700* is present and *SI-RequestConfig* is configured in *PosSI-SchedulingInfo* for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type2 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* to the SI messagesconfigured by *posSchedulingInfoList* in *posSI-SchedulingInfo.* The 1st entry in the list corresponds to the first SI message for which *posSI-BroadcastStatus* or *si-BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI messagefor which *posSI-BroadcastStatus* or *si-BroadcastStatus* is set to *notBroadcasting* and so on.  Change of *si-RequestResources* should not result in system information change notification. |

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| *SI-RequestResources* field descriptions |
| ***ra-AssociationPeriodIndex***  Index of the association period in the *si-RequestPeriod* in which the UE can send the SI request for SI message(s) corresponding to this *SI-RequestResources*, using the preambles indicated by *ra-PreambleStartIndex* and rach occasions indicated by *ra-ssb-OccasionMaskIndex*. |
| ***ra-PreambleStartIndex***  If N SSBs are associated with a RACH occasion, where N > = 1, for the i-th SSB (i=0, …, N-1) the preamble with preamble index = *ra-PreambleStartIndex* + i is used for SI request; For N < 1, the preamble with preamble index = *ra-PreambleStartIndex* is used for SI request. |

***End of changes***