**3GPP TSG-RAN2 Meeting #110 Electronic  *R2-*** ***200xxxx***

**1st June – 12th June 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **1506** | **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:***  | Corrections to PRACH prioritization procedure for MPS and MCS |
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| ***Source to WG:*** | Samsung Electronics |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | TEI16 |  | ***Date:*** | 2020-06-11 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***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 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-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:*** | According to agreed RRC CR (R2-2002102) in RAN2 #109e, ra-PrioritizationForAccessIdentity is added in RACH-ConfigCommon. According to the cover sheet of agreed CR (R2-2002102) the intention is to configure ra-PrioritizationForAccessIdentity in SIB 1 i.e. in RACH-ConfigCommon of initial UL BWP only. This should be clarified in specification.Additionally, RACH prioritization parameters included in ra-PrioritizationForAccessIdentity are applicable for SpCell only as CBRA is not supported for SCell. |
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| ***Summary of change:*** | Clarified that ra-PrioritizationForAccessIdentity is configured in RACH-ConfigCommon and RACH-ConfigCommonTwoStepRA of only initial UL BWP. If configured, it is applied for prioritized random access procedure on any UL BWP of SpCell.Clarified that ra-PrioritizationForAccessIdentity is configured in RACH-ConfigCommonTwoStepRA of only initial UL BWP. If configured, it is applied for prioritized random access procedure on any UL BWP of SpCell. |
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| ***Consequences if not approved:*** | Unecessary signaling overhead; Ambiguity in selection of RACH prioritisation parameters if ra-PrioritizationForAccessIdentity is signaled in multiple UL BWPs. |
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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 ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** |  |

FIRST CHANGE

#### *RACH-ConfigCommon*

The IE *RACH-ConfigCommon* is used to specify the cell specific random-access parameters.

*RACH-ConfigCommon* information element

-- ASN1START

-- TAG-RACH-CONFIGCOMMON-START

RACH-ConfigCommon ::= SEQUENCE {

 rach-ConfigGeneric RACH-ConfigGeneric,

 totalNumberOfRA-Preambles INTEGER (1..63) OPTIONAL, -- Need S

 ssb-perRACH-OccasionAndCB-PreamblesPerSSB CHOICE {

 oneEighth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneFourth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneHalf ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 one ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 two ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},

 four INTEGER (1..16),

 eight INTEGER (1..8),

 sixteen INTEGER (1..4)

 } OPTIONAL, -- Need M

 groupBconfigured SEQUENCE {

 ra-Msg3SizeGroupA ENUMERATED {b56, b144, b208, b256, b282, b480, b640,

 b800, b1000, b72, spare6, spare5,spare4, spare3, spare2, spare1},

 messagePowerOffsetGroupB ENUMERATED { minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},

 numberOfRA-PreamblesGroupA INTEGER (1..64)

 } OPTIONAL, -- Need R

 ra-ContentionResolutionTimer ENUMERATED { sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64},

 rsrp-ThresholdSSB RSRP-Range OPTIONAL, -- Need R

 rsrp-ThresholdSSB-SUL RSRP-Range OPTIONAL, -- Cond SUL

 prach-RootSequenceIndex CHOICE {

 l839 INTEGER (0..837),

 l139 INTEGER (0..137)

 },

 msg1-SubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond L139

 restrictedSetConfig ENUMERATED {unrestrictedSet, restrictedSetTypeA, restrictedSetTypeB},

 msg3-transformPrecoder ENUMERATED {enabled} OPTIONAL, -- Need R

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 ra-PrioritizationForAccessIdentity SEQUENCE {

 ra-Prioritization-r16 RA-Prioritization,

 ra-PrioritizationForAI-r16 BIT STRING (SIZE (2))

 } OPTIONAL -- Cond InitialBWP-Only

prach-RootSequenceIndex-r16 CHOICE {

 l571 INTEGER (0..569),

 l1151 INTEGER (0..1149)

 } OPTIONAL -- Need R

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}

-- TAG-RACH-CONFIGCOMMON-STOP

-- ASN1STOP

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| *RACH-ConfigCommon* field descriptions |
| ***messagePowerOffsetGroupB***Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.2) |
| ***msg1-SubcarrierSpacing***Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2). Only the values 15 or 30 kHz (FR1), and 60 or 120 kHz (FR2) are applicable. If absent, the UE applies the SCS as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* (see tables Table 6.3.3.1-1 and Table 6.3.3.2-2, TS 38.211 [16]). The value also applies to contention free random access (*RACH-ConfigDedicated*), to SI-request and to contention-based beam failure recovery (CB-BFR). But it does not apply for contention free beam failure recovery (CF-BFR) (see *BeamFailureRecoveryConfig*). |
| ***msg3-transformPrecoder***Enables the transform precoder for Msg3 transmission according to clause 6.1.3 of TS 38.214 [19]. If the field is absent, the UE disables the transformer precoder (see TS 38.213 [13], clause 8.3). |
| ***numberOfRA-PreamblesGroupA***The number of CB preambles per SSB in group A. This determines implicitly the number of CB preambles per SSB available in group B. (see TS 38.321 [3], clause 5.1.1). The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*. |
| ***prach-RootSequenceIndex***PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1). The value range depends on whether L=839 or L=139. The short/long preamble format indicated in this IE should be consistent with the one indicated in *prach-ConfigurationIndex* in the *RACH-ConfigDedicated* (if configured). If *prach-RootSequenceIndex-r16* is signalled, UE shall ignore the *prach-RootSequenceIndex* (without suffix). |
| ***ra-ContentionResolutionTimer***The initial value for the contention resolution timer (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on. |
| ***ra-Msg3SizeGroupA***Transport Blocks size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.2). |
| ***ra-PrioritizationForAI***Indicates whether the the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value 1 indicates that the field *ra-Prioritization-r16* applies otherwise the field does not apply (see TS 23.501 [32]). |
| ***ra-Prioritization***Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a). |
| ***rach-ConfigGeneric***RACH parameters for both regular random access and beam failure recovery. |
| ***restrictedSetConfig***Configuration of an unrestricted set or one of two types of restricted sets, see TS 38.211 [16], clause 6.3.3.1. |
| ***rsrp-ThresholdSSB***UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]). |
| ***rsrp-ThresholdSSB-SUL***The UE selects SUL carrier to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). The value applies to all the BWPs. |
| ***ssb-perRACH-OccasionAndCB-PreamblesPerSSB***The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEight* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* \* max(1, *SSB-per-rach-occasion*). See TS 38.213 [13]. |
| ***totalNumberOfRA-Preambles***Total number of preambles used for contention based and contention free random access in the RACH resources defined in *RACH-ConfigCommon*, excluding preambles used for other purposes (e.g. for SI request). If the field is absent, all 64 preambles are available for RA. The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*, i.e. it should be a multiple of the number of SSBs per RACH occasion. |

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| Conditional Presence | Explanation |
| *L139* | The field is mandatory present if *prach-RootSequenceIndex* L=139, otherwise the field is absent, Need S. |
| *SUL* | The field is mandatory present in *initialUplinkBWP* in *supplementaryUplink*; otherwise, the field is absent. |
| InitialBWP-Only | This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise the field is absent. |

SECOND CHANGE

#### *RACH-ConfigCommonTwoStepRA*

The IE *RACH-ConfigCommonTwoStepRA* is used to specify cell specific 2-step random-access type parameters.

*RACH-ConfigCommonTwoStepRA* information element

-- ASN1START

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-START

RACH-ConfigCommonTwoStepRA-r16 ::= SEQUENCE {

 rach-ConfigGenericTwoStepRA-r16 RACH-ConfigCommonTwoStepRA-r16,

 msgA-TotalNumberOfRA-Preambles-r16 INTEGER (1..63) OPTIONAL, -- Need S

 msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB-r16 CHOICE {

 oneEighth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneFourth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneHalf ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 one ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 two ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},

 four INTEGER (1..16),

 eight INTEGER (1..8),

 sixteen INTEGER (1..4)

 } OPTIONAL, -- Cond 2StepOnly

 msgA-CB-PreamblesPerSSB-PerSharedRO-r16 INTEGER (1..60) OPTIONAL, -- Cond SharedRO

 msgA-SSB-SharedRO-MaskIndex-r16 INTEGER (1..15) OPTIONAL, -- Need S

 groupB-ConfiguredTwoStepRA-r16 GroupB-ConfiguredTwoStepRA-r16 OPTIONAL, -- Need S

 msgA-PRACH-RootSequenceIndex-r16 CHOICE {

 l839 INTEGER (0..837),

 l139 INTEGER (0..137)

 } OPTIONAL, -- Cond 2StepOnly

 msgA-RSRP-Threshold-r16 RSRP-Range OPTIONAL, -- Cond 2Step4Step

 msgA-RSRP-ThresholdSUL-r16 RSRP-Range OPTIONAL, -- Cond 2StepSUL

 msgA-RSRP-ThresholdSSB-r16 RSRP-Range OPTIONAL, -- Need S

 msgA-RSRP-ThresholdSSB-SUL-r16 RSRP-Range OPTIONAL, -- Cond 2StepSUL

 msgA-SubcarrierSpacing-r16 SubcarrierSpacing OPTIONAL, -- Cond 2StepOnlyL139

 msgA-RestrictedSetConfig-r16 ENUMERATED {unrestrictedSet, restrictedSetTypeA,

 restrictedSetTypeB} OPTIONAL, -- Cond 2StepOnly

 ra-PrioritizationForAccessIdentityTwoStep-r16 SEQUENCE {

 ra-Prioritization-r16 RA-Prioritization OPTIONAL, -- Need M

 ra-PrioritizationForAI-r16 BIT STRING (SIZE (2)) OPTIONAL -- Need M

 } OPTIONAL, -- Cond InitialBWP-Only

 ra-ContentionResolutionTimer-r16 ENUMERATED {sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64} OPTIONAL, -- Cond 2StepOnly

 ...

}

GroupB-ConfiguredTwoStepRA-r16 ::= SEQUENCE {

 ra-MsgA-SizeGroupA ENUMERATED {b56, b144, b208, b256, b282, b480, b640, b800,

 b1000, b72, spare6, spare5, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M

 messagePowerOffsetGroupB ENUMERATED {minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18} OPTIONAL, -- Need M

 numberofRA-PreamblesGroupA INTEGER (1..64)

}

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-STOP

-- ASN1STOP

Editor's note: Need codes and dependencies when reconfiguring 2-step RA and 4-step RA is still FFS and needs to be analyzed.

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| *RACH-ConfigCommonTwoStepRA* field descriptions |
| ***groupB-ConfiguredTwoStepRA***Preamble grouping for 2-step random access type. If the field is absent then there is only one preamble group configured and only one msgA PUSCH configuration. |
| ***msgA-CB-PreamblesPerSSB-PerSharedRO***Number of contention-based preambles used for 2-step RA type from the non-CBRA 4-step type preambles associated with each SSB for RO shared with 4-step type RA. The number of preambles for 2-step RA type shall not exceed the number of preambles per SSB minus the number of contention-based preambles per SSB for 4-step type RA. The possible value range for this parameter needs to be aligned with value range for the configured SSBs per RACH occasion in *SSB-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. The field is only applicable for the case of shared ROs with 4-step type random access. |
| ***msgA-PRACH-RootSequenceIndex***PRACH root sequence index. If the field is not configured, the UE applies the value in field *prach-RootSequenceIndex* in *RACH-ConfigCommon* in the configured BWP. |
| ***msgA-RestrictedSetConfig***Configuration of an unrestricted set or one of two types of restricted sets for 2-step random access type preamble. If the field is not configured, the UE applies the value in field *restrictedSetConfig* in *RACH-ConfigCommon* in the configured BWP. |
| ***msgA-RSRP-Threshold***The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the BWP. |
| ***msgA-RSRP-ThresholdSSB***UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]). |
| ***msgA-RSRP-ThresholdSSB-SUL***The UE selects SUL carrier to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). The value applies to all the BWPs where 2-step RA is configured. |
| ***msgA-RSRP-ThresholdSUL***The UE selects 2-step random access type to perform random access if SUL carrier is selected based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the BWP. |
| ***msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB***The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEight* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* \* max(1, *SSB-per-rach-occasion*). If the field is not configured and both 2-step and 4-step are configured for the BWP, the UE applies the value in the field *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. |
| ***msgA-SSB-SharedRO-MaskIndex***Indicates the subset of 4-step type ROs shared with 2-step random access type for each SSB. This field is configured when there is more than one RO per SSB. If the field is absent, and 4-step and 2-step has shared ROs, then all ROs are shared. |
| ***msgA-SubcarrierSpacing***Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2). Only the values 15 or 30 kHz (FR1), and 60 or 120 kHz (FR2) are applicable. The field is only present in case of 2-step only BWP, otherwise the UE applies the SCS as derived from the *msgA-PRACH-ConfigurationIndex* in *RACH-ConfigGenericTwoStepRA* in the configured BWP (see tables Table 6.3.3.1-1 and Table 6.3.3.2-2, TS 38.211 [16]). The value also applies to contention free 2-step random access type (*RACH-ConfigDedicated*). |
| ***msgA-TotalNumberOfRA-Preambles***Indicates the total number of preambles used for contention-based and contention-free 2-step random access type when ROs for 2-step are not shared with 4-step. If the field is absent, and 2-step and 4-step does not have shared ROs, all 64 preambles are available for 2-step random access type. |
| ***ra-PrioritizationForAI***Indicates whether the field ra-Prioritization-r16 applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value 1 indicates that the field ra-Prioritization-r16 applies, otherwise the field does not apply. If not configured, the UE shall use the values in the corresponding 4-step configuration if configured. |
| ***ra-ContentionResolutionTimer***The initial value for the contention resolution timer for fallback RAR in case no 4-step random access type is configured (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on. |
| ***ra-Prioritization***Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a). If not configured, the UE shall use the values in the corresponding 4-step configuration if configured. |
| ***rach-ConfigGenericTwoStepRA***2-step random access type parameters for both regular random access and beam failure recovery. |

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| *GroupB-ConfiguredTwoStepRA* field descriptions |
| ***messagePowerOffsetGroupB***Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.1). Absent if only one preamble group is configured. |
| ***numberofRA-PreamblesGroupA***The number of CB preambles per SSB in group A for idle/inactive or connected mode. The setting of the number of preambles for each group should be consistent with *ssb-perRACH-OccasionAndCB-PreamblesPerSSB-TwoStepRA* or *msgA-CB-PreamblesPerSSB* if configured. |
| ***ra-MsgA-SizeGroupA***Transport block size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.1). Absent if only one preamble group is configured. |

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| Conditional Presence | Explanation |
| *2StepOnlyL139* | The field is mandatory present if *prach-RootSequenceIndex* L=139 and no 4-step random access type is configured, otherwise the field is absent, Need S. |
| *2StepSUL* | The field is mandatory present in *initialUplinkBWP* in *supplementaryUplink* when both 2-step and 4-step RA type is configured; otherwise, the field is absent. |
| *2StepOnly* | The field is mandatory present if there are no 4-step random access configurations configured in the BWP, i.e only 2-step random access type configured in the BWP, otherwise the field is Need S. |
| *SharedRO* | The field is mandatory present if the 2-step random access type occasions are shared with 4-step random access type, otherwise the field is not present. |
| *2Step4Step* | The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP, otherwise the field is not present.  |
| InitialBWP-Only | This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise the field is absent. |

END OF CHANGES