3GPP TSG-RAN WG2 #109e-bis Tdoc R2-20xxxxx

E-meeting, April 20 – April 30, 2020

Agenda Item: x.x.x.x

Source: Ericsson

Title: Report of [AT109bis-e][507][2s RA] CP and ASN.1 Issues (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This document summarizes Class 2 and Class 3 issues for 2-Step RA from the ASN.1 review into RAN2#109e-bis up until v60 phase 1.

Issues for where a conclusion can be easily found e.g. based on company input, the Rapporteur have outlined a proposed solution as e.g. “Proposal x: propAgree”.

For most items, companies only need to comment if concerns are found, or improvements to the solution/correction can be made.

Companies may only add any possible input at the end of the document, in section 2.3, including possible outline of proposed changes or additions to specifications, or support for a particular solution already provided there unless the Rapporteur proposed conclusion is acceptable.

Additionally, there are still issues pending input from other groups, or where a solution needs to be based on selecting options or a way forward needing further discussion. These may be added later, or treated separately.

The agreed conclusions will be transferred to 38.331 Rapporteur for final review, as a draft CR to 38.331 v16.0.0 after agreement(email) in the 2-step RA session. Note that this later need to be coordinated and, in some cases, merged with corrections from the general ASN.1 review and other Rel-16 WIs.

# 2.1 ASN.1 Summary of Class 2 and 3 issues

This section shows a snippet of ASN.1 text including the ASN.1 issue from RIL. Note that not all specification text will be added to save space and make the document workable.

#### – *MsgA-PUSCH-Config*

*MsgA-PUSCH-Config* information element

-- ASN1START

-- TAG-MYINFORMATIONELEMENT-START

MsgA-PUSCH-Config-r16 ::= SEQUENCE {

 msgA-PUSCH-ResourceList-r16 SEQUENCE (SIZE(1..2)) OF MsgA-PUSCH-Resource-r16 OPTIONAL, -- Cond InitialBWPConfig

 msgA-TransmformPrecoder-r16 ENUMERATED {enabled, disabled} OPTIONAL, -- Need S

 msgA-DataScramblingIndex-r16 INTEGER (0..1023) OPTIONAL, -- Need S

 msgA-DeltaPreamble-r16 INTEGER (-1..6) OPTIONAL -- Need S

-- TAG-MYINFORMATIONELEMENT-STOP

-- ASN1STOP

Z000, Class 2: msgA-PUSCH-ResourceList is a list but it is only two separate configurations and the second configuration is only applicable when group B is configured.

Proposal: Configure msgA-PUSCH-ResourceGroupA and msgA-PUSCH-ResourceGroupB (the latter being conditional on group B being present).

Rapporteur proposal:

 msgA-PUSCH-ResourceGroupA-r16 MsgA-PUSCH-Resource-r16 OPTIONAL, -- Cond InitialBWPConfig

 msgA-PUSCH-ResourceGroupB-r16 MsgA-PUSCH-Resource-r16 OPTIONAL, -- Cond GroupBConfigured

|  |  |
| --- | --- |
| *GroupBConfigured* | The field is mandatory present if the field *groupB-ConfiguredTwoStepRA* is configured; otherwise it is absent. |

1. PropAgree

E099, Class 2: For a 2-Step RA only BWP configuration, (Need S) field description for *msgA-TransmformPrecoder* does not describe actions when the *TransformPrecoder* IE is not present. The same stands for *msgA-DeltaPreamble-r16*. The current use of Need S together with a “If not configured ..” leads to ambiguity as it may mean present but set to “disable”, or not present, i.e absent.

Proposal:

 msgA-TransmformPrecoder-r16 ENUMERATED {enabled, disabled} OPTIONAL, -- Need R

 msgA-DataScramblingIndex-r16 INTEGER (0..1023) OPTIONAL, -- Need S

 msgA-DeltaPreamble-r16 INTEGER (-1..6) OPTIONAL -- Need R

|  |
| --- |
| *msgA-DeltaPreamble*Power offset of msgA PUSCH relative to the preamble received target power (see TS 38.213 [13], clause 7.1). If the field is absent, the UE shall use the parameter *msg3-DeltaPreamble* of 4-step type RA in the configured BWP if 4-step type RA is configured.  |

1. PropAgree

E100, Class 2: The clarification is not entirely according to the assumption that the same cannot be configured (using “may’” statement). In RAN1 the agreement for this clarification was using a \_shall\_ statement. In any case; to align with 331 terminology, other wording should anyway be used.

Proposal:

|  |
| --- |
| *msgA-PUSCH-PreambleGroup*Indicates the preamble group that the msgA PUSCH configuration is tied to according to *groupB-ConfiguredTwoStep* in *RACH-ConfigCommonTwoStepRA*. If the field is absent then there is only one preamble group configured. If two *msgA-PUSCH-Resource* are configured in the BWP, the network does not configure the same value in the two *msgA-PUSCH-Resource* configurations in this BWP, the network does not configure the same value in the two *msgA-PUSCH-Resource* configurations in this BWP |

1. PropAgree. Comment: depend on Proposal 1 agreement.

E101, Class 2: 1) Start symbol and length can also be provided through PUSCH-Config if provided (CFRA); 2) Clarification for the absence of *PUSCH-TimeDomainAllocation*

Proposal:

|  |
| --- |
| *msgA-PUSCH-TimeDomainAllocation*Indicates a combination of start symbol and length and PUSCH mapping type from the TDRA table (*PUSCH-TimeDomainResourceAllocationList* if provided in *PUSCH-ConfigCommon*, or in *PUSCH-Config,*or else the default Table 6.1.2.1.1-2 in 38.214 [19] is used if *msgA-PUSCH-TimeDomainAllocation* is not provided in PUSCH-ConfigCommon). |

1. PropAgree

I642, Class 2: . Issue 1: Normally the way if a field is mandatory (either directly or because the condition is met), the parent field also becomes mandatory (though strictly, it is applicable only if the parent field is present but that is not often the way we use conditions). This field is mandatory only if 2 step RACH is being used and not mandatory otherwise, while the condition does not seem to have any dependency on 2 step RACH. To avoid ambiguity, suggest to rephrase.

Issue 2: There also seems to be a typo - meant to be “no step”? Can’t follow the logic as the initial part of the statement seems to be imply it is mandatory present in initialUplinkBWP.

Issue 3: Can’t find the statement describing the behaviour on absence for the use of Need S.

Proposal: add some additional qualifier such as “when 2 step RACH is configured in the BWP”, correct logic and typo and update Need code on absence to clarify how it is meant to be. For the first part, the update could be possibly as follows:

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *InitialBWPConfig* | The field is mandatory present in *initialUplinkBWP* when 2-step is configured in BWP but 2-step configuration is not provided in *initialUplinkBWP*, otherwise the field is Need S. |

1. PropReject, Discuss. Applied change does not make the sentence clear. Concerns are valid, but additional changes needed.

Rapporteur proposal:

|  |  |
| --- | --- |
| *InitialBWPConfig* | The field is mandatory present in *initialUplinkBWP* when 2-step RA type is configured in *initialUplinkBWP,* otherwise the field is Need S. |

Z002, Class 3: Once RAN1 replies to our LS (in R2-2002138), we need to add NR-U specific RACH root sequences here. (*msgA-PRACH-RootSequenceIndex-r16*)

Proposal: add NR-U specific RACH root sequences

 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)

 l571 INTEGER (0..569),

 l1151 INTEGER (0..1149)

 } OPTIONAL, -- Cond 2StepOnly

1. Wait for RAN1 input

S501, Class 3: *msgA-RSRP-Threshold-r16* description and condition correction. *msgA-RSRP-Threshold-r16* is used for selection between 2 step and 4 step RA on normal uplink. So, msgA-RSRP-Threshold-r16 should be mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP in Uplink.

However, as per the current description *msgA-RSRP-Threshold-r16* is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP irrespective of uplink or supplementary uplink

Proposal: Update field description and condition as follows:

 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, -- Need R

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

 ...

}

|  |
| --- |
| *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) in Uplink. This field is only present if both 2-step and 4-step RA type are configured for the BWP in Uplink. |

|  |  |
| --- | --- |
| *2Step4Step* | The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP in Uplink, otherwise the field is not present.  |

1. PropReject. Comment: addition does not make any change in RA selection. It is not clear if the addition relates to “perform random access … in Uplink” or relate to “this threshold in Uplink”. In the referenced 38.321 it should be clear on how the threshold is conditioning the RA type selection using the threshold.

Rapporteur proposal: Clarify “BWP” to “Uplink 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 Uplink BWP. |

|  |  |
| --- | --- |
| *2Step4Step* | The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the Uplink BWP, otherwise the field is not present.  |

O910, Class 2: the field description (*msgA-RSRP-ThresholdSUL*) is misleading,

Proposal:

|  |
| --- |
| *msgA-RSRP-ThresholdSUL*If SUL carrier is selected, 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. |

1. propReject, see S502.

S502, Class 3: *msgA-RSRP-ThresholdSUL-r16* description and condition correction.

*msgA-RSRP-ThresholdSUL-r16* is used for selection between 2 step and 4 step RA on supplementary uplink. So, *msgA-RSRP-ThresholdSUL-r16* should be mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP in *SuppplementaryUplink*.

However, as per the current description 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.

Proposal:

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

 msgA-RSRP-ThresholdSUL-r16 RSRP-Range OPTIONAL, -- Cond 2Step4StepSUL

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

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

|  |
| --- |
| *msgA-RSRP-ThresholdSUL*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) in s*uppplementaryUplink*. This field is only present if both 2-step and 4-step RA type are configured for the BWP in s*uppplementaryUplink*. |

|  |  |
| --- | --- |
| *2Step4StepSUL* | The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP in *supplementaryUplink*, otherwise the field is not present. |

1. propAgree

O901, Class 2: Need code for *msgA-RSRP-ThresholdSSB-r16* field is ‘S’. But there is no corresponding description for the absence case

O902, Class 2: *msgA-RSRP-ThresholdSSB-SUL-r16* is applied for carrier selection and the need coded for this parameter is ‘Cond 2StepSUL’. If both 2-step RACH and 4-step RACH is configured on SUL, UE can reuse the parameter configured for 4-step, but it is mandatory for only 2-step is configured on SUL.

Proposals:

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

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

|  |
| --- |
| *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. |

|  |  |
| --- | --- |
| *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. |

1. propDiscuss
Rapporteur proposal: Introduce a new condition “2StepOnlySUL”

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

|  |  |
| --- | --- |
| *2StepOnlySUL* | The field is mandatory present in *initialUplinkBWP* in *supplementaryUplink* 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. |

E102, Class 3: The RACH occasion list associated with the CSI-RS resource, similar to 4-step RACH, is also provided, but the RA occasion indexes should be determined by *msgA-PRACH-ConfigurationIndex* and *msgA-RO-FDM* for 2-step RACH instead of being provided by prach-ConfigurationIndex and msg1-FDM

|  |
| --- |
| *ra-OccasionList*RA occasions that the UE shall use when performing CF-RA upon selecting the candidate beam identified by this CSI-RS. The network ensures that the RA occasion indexes provided herein are also configured by prach-ConfigurationIndex and msg1-FDM. Each RACH occasion is sequentially numbered, first, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions; second, in increasing order of time resource indexes for time multiplexed PRACH occasions within a PRACH slot and Third, in increasing order of indexes for PRACH slots. |

1. Whether CSI-RS is supported or not depends on the RAN1 answer to RAN2 LS (R2-2001929), discuss necessary changes upon input.

Z003, 004, 005, Class 2: Our understanding is that this cannot be configured in case of shared RO because the 4-step RO value will apply in this case. We need to clarify this either in the field description or via conditional code.

Proposal:

|  |
| --- |
| *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. This field is only configured for the case of separate ROs between 2-step and 4-step type random access. |

|  |
| --- |
| *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. This field is only configured for the case of separate ROs between 2-step and 4-step type random access. |

|  |
| --- |
| *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*). This field is only configured for the case of separate ROs between 2-step and 4-step type random access. |

1. PropAgree

Z006, Class2: The field *ra-ContentionResolutionTimer* is conditional “2StepOnly”. The description of the condition says: “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”*.*

For the case when both 2-step and 4-step resources are present, this field is optional and if it is not present in this case, the UE behavior should be specified. Our understanding is that in this case, corresponding value from the 4-step RACH configuration shall be used. So, this “specified” behaviour should be clarified in the field description

Proposal:

|  |
| --- |
| *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. If both 2-step and 4-step random access type resources are configured on the BWP, then this field is absent, and the UE shall use the corresponding value from the *RACH-ConfigCommon.* |

1. propAgree, change “on the BWP” to “in the BWP” to be consistent with other text

Z007, 008, Class 2: The description about absence doesn’t apply since this is a need M field.

Proposal:

|  |
| --- |
| *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).  |

|  |
| --- |
| *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). |

1. propAgree

O903, Class 2: Need code for *cfra-TwoStep-r16* should be same with that for 4-step CFRA.

Proposal: Change to Need S

RACH-ConfigDedicated ::= SEQUENCE {

 cfra CFRA OPTIONAL, -- Need S

 ra-Prioritization RA-Prioritization OPTIONAL, -- Need N

 ...,

 [[

 rachConfigDedicatedIAB-r16 RACH-ConfigDedicated-IAB-v16xy OPTIONAL, -- Need S

 ra-PrioritizationTwoStep-r16 RA-Prioritization OPTIONAL, -- Need N

 cfra-TwoStep-r16 CFRA-TwoStep-r16 OPTIONAL -- Need S

 ]]

}

1. propAgree

S503, Class 3: Incorrect IE for 2 step CFRA PUSCH resource configuration. MsgA-PUSCH-Config-r16 includes two sets of MsgA-PUSCH-Resource-r16. For CFRA only one set is needed.

Proposal:

CFRA-TwoStep-r16 ::= SEQUENCE {

 occasionsTwoStepRA-r16 SEQUENCE {

 rach-ConfigGenericTwoStepRA-r16 RACH-ConfigGeneric,

 ssb-PerRACH-OccasionTwoStepRA-r16 ENUMERATED {oneEighth, oneFourth, oneHalf, one,

 two, four, eight, sixteen} OPTIONAL -- Cond SSB-CFRA

 } OPTIONAL, -- Need S

 msgA-CFRA-PUSCH-r16 MsgA-PUSCH-Resource-r16,

 resourcesTwoStep-r16 CHOICE {

 ssb SEQUENCE {

 ssb-ResourceList SEQUENCE (SIZE(1..maxRA-SSB-Resources)) OF CFRA-SSB-Resource,

 ra-ssb-OccasionMaskIndex INTEGER (0..15)

 },

Rapporteur comment: *RACH-ConfigGeneric*, handled in ASN.1 Editorials

1. propAgree

E104, O905, Z009, Class 2: Parameter *totalNumberOfTwoStepRA-Preambles* should be optional, consistent with field description. (O905) If mapping relationship between preamble and PRU is reused for CFRA, this parameter can be used to define the CFRA preambles per SSB for mapping when dedicated ROs are configured for 2-step CFRA. (Z009), In case of 4-step RA, the corresponding IE is used to distinguish the RAR for normal 4-step RACH and MSG1 based SI request, in which there is no MAC RAR but only RAID. However, in 2-step RACH, this is not applicable.

CFRA-TwoStep-r16 ::= SEQUENCE {

 occasionsTwoStepRA-r16 SEQUENCE {

 rach-ConfigGenericTwoStepRA-r16 RACH-ConfigGeneric,

 ssb-PerRACH-OccasionTwoStepRA-r16 ENUMERATED {oneEighth, oneFourth, oneHalf, one,

 two, four, eight, sixteen} OPTIONAL -- Cond SSB-CFRA

 } OPTIONAL, -- Need S

 msgA-CFRA-PUSCH-r16 MsgA-PUSCH-Config-r16,

 resourcesTwoStep-r16 CHOICE {

 ssb SEQUENCE {

 ssb-ResourceList SEQUENCE (SIZE(1..maxRA-SSB-Resources)) OF CFRA-SSB-Resource,

 ra-ssb-OccasionMaskIndex INTEGER (0..15)

 },

 csirs SEQUENCE {

 csirs-ResourceList SEQUENCE (SIZE(1..maxRA-CSIRS-Resources)) OF CFRA-CSIRS-Resource,

 rsrp-ThresholdCSI-RS RSRP-Range

 }

 },

 totalNumberOfTwoStepRA-Preambles-r16 INTEGER (1..62),

 ...

}

|  |
| --- |
| *totalNumberOfRA-Preambles*Total number of preambles used for contention free random access in the RACH resources defined in CFRA, excluding preambles used for other purposes (e.g. for SI request). If the field is absent but the field *occasions* is present, the UE may assume all the 64 preambles are for RA. The setting should be consistent with the setting of *ssb-perRACH-Occasion*, if present, i.e. it should be a multiple of the number of SSBs per RACH occasion. |

1. propDiscuss, whether parameter is needed, if so, *totalNumberOfTwoStepRA-Preambles* is optionally configured with additional condition.

Rapporteur comment: preambles for (CFRA) SI request does not apply for 2-Step RA type and the parameter seems indeed not needed.

Rapporteur note: The legacy IE “totalNumberOfRA-Preambles” was introduced to indicate the total number of preambles used for contention free random access in each RO of RACH resources defined in CFRA since in case dedicated resources are configured for SI-Request and the ROs are shared with dedicated CFRA resources, an EN-DC only UE would not be able to identify the preambles reserved for SI-Request

E103, Class 3: The sentence should be deleted since these parameters are optional and the network can simply omit them if not needed or wanted. That also leaves the flexibility for the network to do include them, such that they can override the ones configured in the common signalling for this dedicated CFRA-TwoStep configuration. Note that this text was “inherited” from the field description for *rach-ConfigGeneric* in the (legacy) CFRA IE, where the concerned parameters are not optional. Hence, the situation is different for the case of 2-step CFRA and the *rach-ConfigGenericTwoStepRA* IE.

Proposal:

|  |
| --- |
| *rach-ConfigGenericTwoStepRA*Configuration of contention free random access occasions for CFRA 2-step random access type.  |

CFRA-TwoStep-r16 ::= SEQUENCE {

 occasionsTwoStepRA-r16 SEQUENCE {

 rach-ConfigGenericTwoStepRA-r16 RACH-ConfigGeneric OPTIONAL, -- Cond2StepOnly

 ssb-PerRACH-OccasionTwoStepRA-r16 ENUMERATED {oneEighth, oneFourth, oneHalf, one,

 two, four, eight, sixteen} OPTIONAL -- Cond SSB-CFRA

 } OPTIONAL, -- Need S

1. propAgree

O906, Z010, Class 2: Maximum transmission number is not mandatorily configured when 2-step RACH and 4-step RACH are configured simultaneously on the BWP. If it is absent, *preambleTransMa*x configured for 4-step RACH can be reused*.*

Proposal:

RACH-ConfigGenericTwoStepRA-r16 ::= SEQUENCE {

 msgA-PRACH-ConfigurationIndex-r16 INTEGER (0..262) OPTIONAL, -- Cond 2StepOnly

 msgA-RO-FDM-r16 ENUMERATED {one, two, four, eight} OPTIONAL, -- Cond 2StepOnly

 msgA-RO-FrequencyStart-r16 INTEGER (0..maxNrofPhysicalResourceBlocks-1) OPTIONAL, -- Cond 2StepOnly

 msgA-ZeroCorrelationZoneConfig-r16 INTEGER (0..15) OPTIONAL, -- Cond 2StepOnly

 msgA-PreamblePowerRampingStep-r16 ENUMERATED {dB0, dB2, dB4, dB6} OPTIONAL, -- Cond 2StepOnly

 msgA-PreambleReceivedTargetPower-r16 INTEGER (-202..-60) OPTIONAL, -- Cond 2StepOnly

 msgB-ResponseWindow-r16 ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80, sl160, sl320},

 preambleTransMax-r16 ENUMERATED {n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200}, OPTIONAL, -- Cond 2StepOnly

 msgA-TransMax-r16 ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200} OPTIONAL, -- Need R

 ...

}

1. propAgree optional with cond 2stepOnly

S504, Class 2: *msgA-TransMax-r16* is applicable if switching to 4 step RA is supported. However current text states otherwise.

Proposal:

|  |
| --- |
| *msgA-TransMax*Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). This field may only be applicable in case of 2-step and 4-step RA type are configured and switching to 4-step type RA is supported.  |

1. propAgree.

# 2.2 Input based on Submissions (TDoc)

R2-2003630 (draft CR), RIL H072, Class 3:

Description summary:

The current structure as follows separate the configurations of RACH resource and MSGA resource.

 rach-ConfigCommonTwoStepRA-r16 SetupRelease { RACH-ConfigCommonTwoStepRA-r16 } OPTIONAL, -- Need M

 msgA-PUSCH-Config-r16 SetupRelease { MsgA-PUSCH-Config-r16 } OPTIONAL -- Need M

There are two issues with the current configuration

1. The current structure allows configuring only msgA payload or msgA PRACH, while there is no use case for that. msgA PRACH and payload should be either absent or present at the same time.
2. The previous agreement that 2-step RACH can only be configured on SpCell is not reflected

Change Proposal:

– *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-ConfigCommonIAB-r16 } OPTIONAL, -- Need M

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

msgA-ConfigCommon-r16 SteupRelease { MsgA-ConfigCommon-r16 } OPTIONAL -- Cond SpCellOnly

 ]]

}

-- TAG-BWP-UPLINKCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| *BWP-UplinkCommon* field descriptions |
|  |
| *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. The network configures *rach-ConfigCommon*, whenever it configures contention free random access (for reconfiguration with sync or for beam failure recovery).  |
| *rach-ConfigCommonIAB*Configuration of cell specific random access parameters for the IAB-MT. |
|   |
| *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 38.213 clause 8.3 and 38.214 clause 6.1.2.2) and uses interlaced PUCCH Format 0, 1, 2, and 3 for cell-specific PUCCH (see TS 38.213 [13], clause 9.2.1). |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *SpCellOnly* | The field is optionally present, Need M, in the *BWP-UplinkCommon* of an SpCell. It is absent otherwise.  |

– *MsgA-ConfigCommon*

The IE *msgA-ConfigCommon* is used to configure the PRACH and PUSCH resource for transmission of MsgA in 2-step random access type procedure.

-- ASN1START

-- TAG-MSGA-CONFIG-COMMON-START

MsgA-ConfigCommon-r16 ::= SEQUENCE {

 rach-ConfigCommonTwoStepRA-r16 RACH-ConfigCommonTwoStepRA-r16,

 msgA-PUSCH-Config-r16 MsgA-PUSCH-Config-r16

}

-- TAG-MSGA-CONFIG-COMMON-STOP

-- ASN1STOP

| *MsgA-ConfigCommon* field descriptions |
| --- |
| *msgA-PUSCH-Config*Configuration of cell-specific MsgA PUSCH parameters which the UE uses for contention-based MsgA PUSCH transmission of this BWP. |
| *rach-ConfigCommonTwoStepRA*Configuration of cell specific random access parameters which the UE uses for contention based and contention free 2-step random access type procedure as well as for 2-step RA type contention based beam failure recovery in this BWP. The NW configures SSB-based RA (and hence *RACH-ConfigCommonTwoStepRA*) 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 BL BWP. The network configures *rach-ConfigCommonTwoStepRA* whenever it configures CFRA with 2-step type (for reconfiguration with sync).  |

1. propDiscuss

Rapporteur comment: Change is not essential, however explicitly captures the SpCell agreement.

Considering the reason for change for 1), similar effect on configuration aspects could be made with a statement in e.g. field description(s)/note for the IE(s) of *rach-ConfigCommonTwoStepRA* and/or *msgA-PUSCHConfig:* ” Network ensures that *…* are both configured …” etc.

R2-2003255 Remaining issue on 2-step CFRA, No RIL

Description: In the latest Rel-16 RRC spec [1], the *msgA-TransMax* can be configured via dedicated signaling through *rach-ConfigGenericTwoStepRA*. For 2-step CFRA UE, it is possible that the target cell configures UE with smaller value of *msgA-TransMax* to allow UE fast switching to 4-step RACH to avoid taking relative long time on 2-step CFRA attempts. Since 2-step CFRA UE is configured with dedicated preamble and dedicated PUSCH resource, it usually does not need to attempt so many times like the 2-step CBRA case when performing the handover. Hence, the value of *msgA-TransMax* can be different from that configured in the *RACH-ConfigCommonTwoStepRA*.

– RACH-ConfigDedicated

|  |
| --- |
| *CFRA-TwoStep* field descriptions |
| *rach-ConfigGenericTwoStepRA*Configuration of contention free random access occasions for CFRA 2-step random access type. The UE shall ignore *msgA-preambleReceivedTargetPower*, *preambleTransMax*, *msgA-powerRampingStep*, *msgB-ResponseWindow, msgA-TransMax* signaled within this field and use the corresponding values provided in *RACH-ConfigCommonTwoStepRA*. |

We propose that UE should ignore the *msgA-TransMax* configured in the *RACH-ConfigCommonTwoStepRA* and shall be allowed to use the corresponding value of *msgA-TransMax* in *rach-ConfigGenericTwoStepRA* configured in *RACH-ConfigDedicated*.

1. Rapporteur comment on R2-2003255: propReject (pending discussion of Proposal 18).
Related to E103, proposal 18 (propAgree). If proposal 18 is agreed, the NW have the option of using another (smaller) value of *msgA-TransMax*.
Note: The “usefulness” of smaller *msgA-TransMax* is discussed in the UP part of 2-step RA

# **R2-2003649 Correction on 2-step RACH configurations in RRC, Disc., No RIL**

Description: In *RACH-ConfigDedicated,* the *totalNumberOfRA-Preambles* in *CFRA* indicates the total number of preambles used for CFRA. If the *totalNumberOfRA-Preambles* is absent and the *occasions* is present, which means the CFRA has separated RA occasions, the UE may assume all the 64 preambles are for the CFRA. Similarly, the *totalNumberOfTwoStepRA-Preambles* in *CFRA-TwoStep* indicates the total number of preambles used for 2-step CFRA. The *totalNumberOfTwoStepRA-Preambles* also can be absent to indicate that all the 64 preambles are for the 2-step CFRA when the 2-step CFRA has separated RA occasions.

According to TS 38.331 [2], the field description of *totalNumberOfTwoStepRA-Preambles* notify that it can be absent, however it isn’t optional in the IE *RACH-ConfigDedicated*. To align 2-step RA with 4-step RA and make the configuration of *totalNumberOfTwoStepRA-Preambles* consistent with its field description, the *totalNumberOfTwoStepRA-Preambles* should be optional in *RACH-ConfigDedicated*.

1. Rapporteur comment on R2-2003649: propReject (pending discussion of Proposal 17)
Related to E104, O905, Z009, Class 2, proposal 17.

# **R2-2002556 Issues for 2 step RA, Disc., No RIL**

Description: If 2 step CFRA resources are configured and *msgA-TransMax* is configured in *rachConfigDedicated*, UE switches to 4 step RA upon transmitting MsgA *msgA-TransMax* times. If 2 step CFRA resources are configured and *msgA-TransMax* is not configured in *rachConfigDedicated*, switching to 4 step RA is not allowed.

1. Rapporteur comment on R2-2002556: propReject (pending discussion of Proposal 18, 20)
Related to E103, S504, proposal 18, 20 (propAgree). If agreed, the UE will apply the value of *msgA-TransMax* if signaled in *RACH-ConfigDedicated.* Switching not allow if proposal 20 is agreed.

# **R2-2003631, RIL H076-078, DraftCR for RACH-ConfigCommonTwoStepRA**

Description (shortened): ConfigCommonTwoStepRA and RACH-ConfigGenericTwoStepRA related to 2-step are optional with conditional presence tag such that it is only for 2-step. However, for some parameters, they can also be applicable when both 2-step/4-step RACH are configured while the ROs are separated. In R15 a new field RACH-ConfigGeneric was created, the reason was all the fields within RACH-ConfigGeneric are mandatory present. For 2-step RACH, parameters that have the same characteristics that they are only present under 2-step RACH only and separate RO. It is proposed that these “generic” parameters should be put under the same IE such that the signaling overhead can be saved:

1. Put all the parameters with the conditional presence tag “2StepOnly” under RACH-ConfigGenericTwoStepRA and move the parameters within RACH-ConfigGenericTwoStepRA without “2StepOnly” under RACH-ConfigCommonTwoStepRA
2. Contionally tag RACH-ConfigGenericTwoStepRA under RACH-ConfigCommonTwoStepRA with “2StepRACHOnlySeparateRO”
3. Remove the EN “Editor's note: Need codes and dependencies when reconfiguring 2-step RA and 4-step RA is still FFS and needs to be analyzed.”

Change Proposal:

=================================================FIRST CHANGE=====================================================

– *RACH-ConfigGenericTwoStepRA*

The IE *RACH-ConfigGenericTwoStepRA* is used to specify the 2-step random access type parameters.

*RACH-ConfigGenericTwoStepRA* information element

-- ASN1START

-- TAG-RACH-CONFIGGENERICTWOSTEPRA-START

RACH-ConfigGenericTwoStepRA-r16 ::= SEQUENCE {

 msgA-PRACH-ConfigurationIndex-r16 INTEGER (0..262),

 msgA-RO-FDM-r16 ENUMERATED {one, two, four, eight},

msgA-RO-FrequencyStart-r16 INTEGER (0..maxNrofPhysicalResourceBlocks-1),

 msgA-ZeroCorrelationZoneConfig-r16 INTEGER (0..15),

 msgA-PreamblePowerRampingStep-r16 ENUMERATED {dB0, dB2, dB4, dB6},

 msgA-PreambleReceivedTargetPower-r16 INTEGER (-202..-60),

 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)

 },

 msgA-PRACH-RootSequenceIndex-r16 CHOICE {

 l839 INTEGER (0..837),

 l139 INTEGER (0..137)

 },

 msgA-SubcarrierSpacing-r16 SubcarrierSpacing OPTIONAL, -- Cond L139

 msgA-RestrictedSetConfig-r16 ENUMERATED {unrestrictedSet, restrictedSetTypeA, restrictedSetTypeB},

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

 ...

}

-- TAG-RACH-CONFIGGENERICTWOSTEPRA-STOP

-- ASN1STOP

|  |
| --- |
| *RACH-ConfigGenericTwoStepRA* field descriptions |
| *msgA-PreamblePowerRampingStep*Power ramping steps for msgA PRACH. If the field is absent, UE shall use the value of *powerRampingStep* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.321 [3], 5.1.3). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| *msgA-PreambleReceivedTargetPower*The target power level at the network receiver side (see TS 38.213 [13], clause 7.1.1 and TS 38.321 [3], clause 5.1.1). Only multiples of 2 dBm may be chosen (e.g -202, -200, -198, …). If the field is absent, UE shall use the value of *preambleReceivedTargetPower* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| *msgA-PRACH-ConfigurationIndex*Cell-specific PRACH configuration index for 2-step RA type. If the field is absent the UE shall use the value of corresponding 4-step random access parameter in the configured BWP. If the value is in the range of 256 to 262, the field *prach-ConfigurationIndex-v16xy* should be considered configured (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| *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-RO-FDM*The number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance. If the field is absent, UE shall use value of *msg1-FDM* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| *msgA-RO-FrequencyStart*Offset of lowest PRACH transmissions occasion in frequency domain with respect to PRB 0. If the field is absent, UE shall use value of *msg1-FrequencyStart* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.211 [16], clauses 5.3.2 and 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| *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-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-ZeroCorrelationZoneConfig*N-CS configuration for msgA preamble, see Table 6.3.3.1-5 in TS 38.211 [16]. If the field is absent, UE shall use value *zeroCorrelationZoneConfig* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
|  |
|  |
| *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. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
|  |  |
| *L139* | The field is mandatory present if *prach-RootSequenceIndex* L=139, otherwise the field is absent, Need S. |

==============================================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 OPTIONAL, -- Cond 2StepOnlySeparateRO

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

 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-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

 ra-PrioritizationForAccessIdentityTwoStep-r16 SEQUENCE {

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

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

} OPTIONAL, -- Need R

 msgB-ResponseWindow-r16 ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80, sl160, sl320},

 preambleTransMax-r16 ENUMERATED {n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200},

 msgA-TransMax-r16 ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200} OPTIONAL, -- Need R

 ...

}

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.

|  |
| --- |
| *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-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-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-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. |
| *msgA-TransMax*Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). This field may only be applicable in case of 2-step and 4-step RA type are configured or switching to 4-step type RA is not supported. |
| *msgB-ResponseWindow*MsgB monitoring window length in number of slots. The network configures a value lower than or equal to 40ms (see TS 38.321 [3], clause 5.1.1). |
| *preambleTransMax*Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5). |
| *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-Prioritization*Parameters which apply for prioritized random access procedure for specific Access Identities. 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. |

|  |
| --- |
| *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. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
|  |  |
| *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. |
| *2StepOnlySeparateRO* | 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, or if both 2-step and 4-step random access types are configured and separate RACH occasions for the two random access types are configured; otherwise the field is absent. |
| *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.  |

==============================================END OF CHANGES=====================================================

1. propReject

Rapporteur comment:
The proposed correction does not constitute as an essential change (even if having “generic” 2 Step RA type parameters under the same IE may have some benefits in the signaling structure for 2 Step RA type).

The CR also does not seem to save signaling as two IEs still need to be signaled even with grouping. The new field condition for *rach-ConfigGenericTwoStepRA-r16* says:

|  |  |
| --- | --- |
| *2StepOnlySeparateRO* | 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, or if both 2-step and 4-step random access types are configured and separate RACH occasions for the two random access types are configured; otherwise the field is absent. |

As a result, if the network includes *RACH-ConfigCommonTwoStepRA* (i.e., the parent IE) then it needs necessarily to include also *RACH-ConfigGenericTwoStepRA* (the child IE). Therefore, the field condition is always fulfilled.

Note that the current structure was chosen to pedagogically have the same format and naming convention as with legacy and keeping 4-step and 2-step IEs next to each other.

New v2:

R2-2003666, No RIL

Description:

Network can independently configure each *preambleTransMax* for 4-step and 2-step RA type when both 2-step and 4-step RA type are configured on a BWP. It can mean that these parameters can have different values. Thus, it is necessary to specify the restriction that *msgA-TransMax* should have a value less than *preambleTransMax* for 4-step RA type, not *preambleTransMax* for 2-step RA type. If the restriction is not specified, UE may NOT indicate a Random Access problem to upper layers. For example, in case that *preambleTransMax* and *msgA-TransMax* for 2-step RA type and *preambleTransMax* for 4-step RA type are 10, 8 and 7, respectively, the UE doesn’t indicate a Random Access problem to upper layers because PREAMBLE\_TRANSMISSION\_COUNTER (i.e., 9) is already larger than *preambleTransMax* for 4-step RA type (i.e., 7) when the UE switches to 4-step RA type.

Proposal:

|  |
| --- |
| ***msgA-TransMax***Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). This field has a value less than *preambleTransMax* included in *RACH-ConfigGeneric* andmay only be applicable in case of 2-step and 4-step RA type are configured or switching to 4-step type RA is not supported.  |

**Rapporteur comment: This configurable limitation can be treated assuming a NW configuring separate values for the parameters also does so sensibly. Change has collision with other corrections.**

1. propReject

New v2:

**Vivo, Class 2, No RIL**: Need code for *ra-MsgA-SizeGroupA* and *messagePowerOffsetGroupB* should be the same as that for *numberofRA-PreamblesGroupA*. This is because they are always needed for preamble group selection.

Proposal:

GroupB-ConfiguredTwoStepRA-r16 ::= SEQUENCE {

 ra-MsgA-SizeGroupA 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)

}

**Rapporteur comment: Add RIL# to ASN.1 review to keep track as there is no Tdoc.**

1. TBD

New v2:

**Vivo, Class 2, No RIL,**

Description: Use ENUMERATED (i.e. 27 possbile values) struct for the *msgA-CB-PreamblesPerSSB-PerSharedRO*, similarly to *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in the 4-step RACH.

Proposal:

msgA-CB-PreamblesPerSSB-PerSharedRO-r16 ENUMERATED (n1,n2,n3,n4,n5,n6,n7,n8,n9,n10,n11,n12,n13,n14,n15,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60)  OPTIONAL, -- Cond SharedRO

*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 field is only applicable for the case of shared ROs with 4-step type random access.

**Rapporteur comment: Add RIL# to ASN.1 review to keep track as there is no Tdoc.**

1. TBD

# 2.3 Comments

|  |  |  |
| --- | --- | --- |
| Company | Proposal x, RIL, Comment | Description/Proposed change |
| Example | Proposal 40, E000:The added parameter *emeetingTime-r16* in *meetinConfigCommon* must be OPTIONAL, Cond -- DelegateAwake as otherwise nothing will be agreed, and the meeting will be extended | emeetingTime-r16 ENUMERATED {veryShort, short} OPTIONAL, -- Cond DelegateAwake |
| ZTE | Proposal 5: We think the need code is only applicable to the corresponding IE, but has nothing to do with the parent IE (i.e. even the IE is conditional mandatory, the parent IE can be absent). The guideline has been captured in 38.331 section 6.1.2 that “For downlink messages, the need codes, conditions and ASN.1 defaults specified for a particular (child) field only apply in case the (parent) field including the particular field is present. Thus, if the parent is absent the UE shall not release the field unless the absence of the parent field implies that. ”Therefore, we think current field description is correct and we can keep it as it is.Proposal 7: Considering NUL and SUL have its own BWP, and the 2-step RACH resource on NUL and SUL are configured in the BWP of NUL and SUL accordingly, we think we can combine the two IEs “msgA-RSRP-Threshold-r16” and “msgA-RSRP-ThresholdSUL-r16” (i.e. remove the msgA-RSRP-ThresholdSUL-r16). One IE “msgA-RSRP-Threshold-r16” is sufficient and it is applicable to the carrier (i.e. SUL/NUL) where the IE is configured. If the change is agreed, then the MAC spec need to be updated accordingly.Proposal 10: We agree with the Rapporteur proposal and maybe we can then avoid online discussion?Proposal 17: If the parameter is not useful (as the rapporteur also seems to conclude), we should delete it. Proposal 18: We are okay with the proposal to delete the field description text. We think making RACH-ConfigGeneric Optional has the undesirable side effects (since some of the fields in this IE are Need -S or Need -R, i.e. not all IEs are Need -M). Maybe we could keep this as a mandatory IE still since in any case at least an empty container may need to be included (?). Proposal 21: We agree this is not essential. But we are okay with the proposed change. It seems to make the structure better. Proposal 22: We agree that we should wait for UP discussion to conclude first. General: All other proposals from rapporteur seem fine to us.  |  |
| LG | Proposal 10, No RIL:Description of 2StepOnlySUL is a little bit unclear for me because initial BWP has always 4-step RA.Moreover, this parameter hasn’t been reflected in MAC spec. We need to discuss how this parameter should be specified for alignment between RRC and MAC. | *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 only 2-step RA is configured.*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 4-step RA is configured. |
| LG | Proposal 17, No RIL:RAN2 sent LS on mapping between dedicated preamble and PRU to RAN1. We haven’t yet received reply LS. Necessity of this totalNumberOfTwoStepRA-Preambles depends on the reply LS. Thus, wait for the reply LS and then add new parameter(s). | CFRA-TwoStep-r16 ::= SEQUENCE {... ...} |
| LG | New:We submitted CP related draft CR (in R2-2003666) to UP section due to Tdoc Limitation. Network can independently configure each *preambleTransMax* for 4-step and 2-step RA type when both 2-step and 4-step RA type are configured on a BWP. It can mean that these parameters can have different values. Thus, it is necessary to specify the restriction that *msgA-TransMax* should have a value less than *preambleTransMax* for 4-step RA type, not *preambleTransMax* for 2-step RA type. | *msgA-TransMax*Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). ….. This field has a value less than *preambleTransMax* included in *RACH-ConfigGeneric*. |
|  |  |  |
| OPPO | Proposal 3, RIL: O911, we are open to capture it here. A typo need to be fixed is that the last sentence is repeated twice. But we are wondering whether this feature has been captured in RAN1 spec. If it is included, we can avoid repeating the descriptions between specs.  |

|  |
| --- |
| *msgA-PUSCH-PreambleGroup*Indicates the preamble group that the msgA PUSCH configuration is tied to according to *groupB-ConfiguredTwoStep* in *RACH-ConfigCommonTwoStepRA*. If the field is absent then there is only one preamble group configured. If two *msgA-PUSCH-Resource* are configured in the BWP, the network does not configure the same value in the two *msgA-PUSCH-Resource* configurations in this BWP. |

 |
| OPPO | Proposal 4, RIL: O912, the field is optional with need code S, we need to specify the UE behavior when it is absent. Or this field should be mandatory present?In addition, for CFRA case, not sure whether the symbol start and length can refer to the  *PUSCH-TimeDomainResourceAllocationList* provided in *PUSCH-Config*. If so, how to determine the TDRA table is ambiguous. i.e. for CFRA case, if *PUSCH-TimeDomainResourceAllocationList* is provided both in *PUSCH-ConfigCommon* and *in PUSCH-Config*, which one to choose is not clarified.  |  |
| OPPO | Proposal 5, RIL:O913, the conditional mandatory code for MsgA PUSCH resource is added due to the description ’ If the active UL BWP is not the initial UL BWP and msgA-PUSCH-config is not provided for the active UL BWP, the UE uses the msgA-PUSCH-config provided for the initial active UL BWP.’ in 38.213 running CR for 2-step RACH. There are two possible options for RRC configurations: Option1: PUSCH resources should be mandatory present in initial uplink BWP regardless of whether initial uplink BWP is configured with 2-step RA or not. Option2:PUSCH resources should be mandatory present in initial uplink BWP when configured with 2-step RA. Otherwise, if 2-step RA is not configured in initial Uplink BWP, MsgA PUSCH resources should be mandatorily provided in the BWP (non-initial uplink BWP) when 2-step RA is configured. According to rapporteur’s proposal, the RRC configuration may turns to option2. Therefore, the description for msgA-PUSCH-ResourceList-r16 should take into account the case when 2-step RA type is not configured in initial uplink BWP, the UE can not use the MsgA PUSCH configuration of initial UL BWP. | Redefine this mandatory presence field:

|  |  |
| --- | --- |
| *BWPConfig* | The field is mandatory present in *initialUplinkBWP* when 2-step RA type is configured in initialUplinkBWP*,* and this field is mandatory present in non-initial uplink BWP when 2-step RA type is not configured in initial uplink BWP,otherwise the field is Need S. |

 |
| OPPO | Proposal 10, RIL: O914, agree with rapporteur’s proposal. |  |
| OPPO | Proposal 14, RIL: O915, wondering why the need code for *messagePowerOffsetGroupB* and *ra-MsgA-SizeGroupA* is set as ‘M’. In 4-step RACH, the field for preamble groups configuration is as follows: 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 | 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, messagePowerOffsetGroupB ENUMERATED {minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18}  numberofRA-PreamblesGroupA INTEGER (1..64)} OPTIONAL, -- Need R |
| OPPO | Proposal 15, RIL: O916, if Need code S is agreed, we need to change the field description correspondingly. | *cfra-TwoStep*Parameters for contention free 2-step random access type to a given target cell. Network ensures that *cfra* and *cfra-TwoStep* are not configured at the same time. If this field and *cfra* are absent, the UE performs contention based random access. |
| OPPO | Proposal 17, RIL: O917, after further thinking, we agree with rapporteur’s proposal to delete the field since there is no strong use case to introduce the indication of CFRA preambles in current spec expect for making the preamble allocation more flexible and extensible. |  |
| OPPO | Proposal 18, RIL: O918, the parameters included in *RACH-ConfigGenericTwoStepRA are mostly with Cond 2StepOnly.* For the case when 2-step CFRA and 2-step CBRA are configured on the BWP without 4-step RA, the parameters are mandatory present both in CF and CB. Thus, we still need to clarify which parameter UE should follow. |  |
| vivo | Propose 12:The newly added clarification is not appliable to the field *msgA-SubcarrierSpacing* since it is only needed in the case of 2-step only BWP. Besides, we propose to use the expression that “this field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA” instead, which is already used for the description of some parameters (e.g. *msgA-PreamblePowerRampingStep*) within the *RACH-ConfigGenericTwoStepRA.*  | *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. This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.*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. This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| vivo | Propose 18:In fact, in the previous meeting, we have proposed that the value of msgB-ResponseWindow provided in the RACH-ConfigDedicated can override that provided in RACH-ConfigCommonTwoStepRA. However, no one supports this since this reverts the legacy principle. Thus, it might be better to treat it as propDiscuss. |  |
| vivo | New:Class 2: Need code for *ra-MsgA-SizeGroupA* and messagePowerOffsetGroupB should be the same as that for numberofRA-PreamblesGroupA. This is because they are always needed for preamble group selection.  | GroupB-ConfiguredTwoStepRA-r16 ::= SEQUENCE { ra-MsgA-SizeGroupA 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)} |
| vivo | New:Class 2: Use ENUMERATED (i.e. 27 possbile values) struct for the *msgA-CB-PreamblesPerSSB-PerSharedRO*, similarly to ssb-perRACH-OccasionAndCB-PreamblesPerSSB in the 4-step RACH. Besides, currently, we use INTEGER to indicate the possible value, which implies that 6 bits are needed for overhead, compared with 5 bits for ENUMERATED. | msgA-CB-PreamblesPerSSB-PerSharedRO-r16 ENUMERATED (n1,n2,n3,n4,n5,n6,n7,n8,n9,n10,n11,n12,n13,n14,n15,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60)  OPTIONAL, -- Cond SharedRO*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 field is only applicable for the case of shared ROs with 4-step type random access. |
| Huawei | Proposal2Why the field msgA-DeltaPreamble is changed to need R while there is still “if the field is absent…”?Proposal3Maybe we can remove this field if in proposal1, GroupA and groupB are separately configured?Proposal4:is used if *msgA-PUSCH-TimeDomainAllocation* is not provided in PUSCH-ConfigCommon). Is not needed because it is already “or else”Proposal7, same comment for proposal8We support this change from SS that the configuration is per UL carrier if both 2-step/4-step are configured. Imagine the scenario where 2-step is configured in NUL while 40step is configured in SUL, does this satisfy the current condition?Proposal12:Prefer to calrify this via cond codeProposal 13:“and the UE shall use the corresponding value from the *RACH-ConfigCommon.”* This part is redundant because this parameter is not for 2-step RACH. Also, it is clear from MAC specProposal14:This field is not needed from the perspective of 2-step RACH because msg1 based SI request is not supported for 2-step RACH. The only consideration that why we may keep this field is for future extension. BTW, there is no such a thing of CFRA SI requestPorposal25,I am not sure if I am the only one who does not feel comfortable looking at all the conditional presence tag in RACH-COnfigCommonTwoStepRAThe main reason for the change is that it takes extra bits to signal the conditional presences of 2-stepOnly. ~10bits in the system information/dedicated signallng would be thrown away because of this.  |  |
|  |  |  |

# 2.4 Conclusion

Based on the discussion and company input in the previous sections it is proposed to conclude the following:

As some corrections need further discussion based on company input (until April 21), it is suggested that as an intermediate conclusion agree on a subset of the proposed changes. The email discussion will then continue progressing conclusions for the remaining points including additions

The following Rapporteur proposals are suggested to be agreed unchanged:

**Proposal 1: Configure *msgA-PUSCH-ResourceGroupA* and *msgA-PUSCH-ResourceGroupB* (the latter being conditional on group B being present).**

**Proposal 4: Start symbol and length can also be provided through PUSCH-Config if provided (CFRA); 2) Clarification for the absence of *PUSCH-TimeDomainAllocation.***

**Proposal 14: For *messagePowerOffsetGroupB* and *ra-MsgA-SizeGroupA* absence description does not apply since this is a need M field and is removed.**

**Proposal 15: Need code for *cfra-TwoStep-r16* should be same with that for 4-step CFRA, Need S. Add IE field description similar to 4 Step RA to include “If this field is absent, the UE performs contention based random access.”**

**Proposal 16: Agree correction of IE for 2 step CFRA PUSCH resource configuration, *MsgA-PUSCH-Resource-r16***

**Proposal 18: Delete sentence on ignoring parameters in field description for *rach-ConfigGenericTwoStepRA* as there is optionality in signaling whereas this was mandatory in legacy.**

**Proposal 19: Agree *preambleTransMax-r16* to be optional with condition 2StepOnly**

**Proposal 20: Agree correction so that *msgA-TransMax-r16* is applicable if switching to 4 step RA is supported**

The following proposals are suggested to be agreed with an updated rapporteur suggestion based on company input:

**Proposal 2: *msgA-TransmformPrecoder* and *msgA-DeltaPreamble-r16* are changed to Optional Need R, and sentence “**If the field is absent, the UE shall use the parameter *msg3-DeltaPreamble* of 4-step type RA in the configured BWP if 4-step type RA is configured.**” Is removed.**

**Proposal 3: If Proposal 1 above is agreed and thus *msgA-PUSCH-ResourceGroupA* and *msgA-PUSCH-ResourceGroupB* is separately configured, the parameter *msgA-PUSCH-PreambleGroup* is not needed.**

**Proposal 12: Agree change for *msgA-SubcarrierSpacing.* For *msgA-PRACH-RootSequenceIndex* and *msgA-RestrictedSetConfig*, agree change with the added conditional sentence changed from “This field is only configured for the case of separate ROs between 2-step and 4-step type random access.” to “When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access.”**

**Proposal 13: Agree the clarification in *ra-ContentionResolutionTimer* field description with the removal of “and the UE shall use the corresponding value from the *RACH-ConfigCommon”***

**Proposal 17: Agree to remove parameter *totalNumberOfRA-Preambles* since preambles for (CFRA) SI request does not apply for 2-Step RA type.**