**3GPP TSG-RAN WG2 Meeting #127  *R2-2407844***

**Maastricht, Netherlands, 19th - 23rd August 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **4969** | **rev** | **-** | **Current version:** | **18.2.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Correction on MIMOevo |
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| ***Source to WG:*** |  Ericsson |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_MIMO\_evo\_DL\_UL-Core |  | ***Date:*** | 2024-08-29 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | In RAN2 in the following was agreed to align 38.331 with RAN1 agreements:To update the description of the condition *SRSsets* to make the field mandatory present only for Rel-17 mTRP PUSCH repetition for *mappingPattern-r17* in IE ConfiguredGrantConfig and IE PUSCH-Config. To clarify that the *N\_TA-Offset2* is applied only for inter-cell multi-DCI multi-TRP operation with two TA.To update the condition description for IE *applyIndicatedTCI-State-r18* to enable that it can be configured with *followUnifiedTCI-StateSRS* |
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| ***Summary of change:*** | 1. For *mappingPattern-r17* in IE ConfiguredGrantConfig and IE PUSCH-Config, change the the description of the condition *SRSsets* to make the field mandatory present only for Rel-17 mTRP PUSCH repetition.
2. In the field description of *n-TimingAdvanceOffset2* clarify that *N\_TA-Offset2* is applied only for inter-cell multi-DCI multi-TRP operation with two TA, i.e, for PDCCH order CFRA towards the additional PCI and for all UL transmission associated to tag2.
3. The condition description for IE *applyIndicatedTCI-State-r18* is updated to enable that it can be configured with *followUnifiedTCI-StateSRS*

**Impact analysis**Impacted 5G architecture options:  NR SA, (NG)EN-DC, NR-DCImpacted functionality: MIMO multi-TRP Interoperability: For change 1:If the NW implements this CR but not the UE, there might be no operability issue because mappingPattern-r17 is not used in Rel-18 STx2P. If the UE implements this CR but not the NW, there might be no operability issue because UE may ignore mappingPattern-r17 as it is not used Rel-18 STx2P.For change 2:If the NW implements this CR but not the UE, there is no operability issue.If the UE implements this CR but not the NW, there is no operability issue.For change 3:If the NW implements this CR but not the UE, there might be no operability issue because UE may not expect to be configured with both *followUnifiedTCI-StateSRS* and *applyIndicatedTCI-State*. If the UE implements this CR but not the NW, there might be no operability issue because UE may not to be configured with both *followUnifiedTCI-StateSRS* and *applyIndicatedTCI-State*. |
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| ***Consequences if not approved:*** | SRS configuration in mTRP, Multi-TRP with 2TA and multi-TRP STx2P introduced in MIMOevo of Release-18 are not correctly supported. |
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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:*** |  |

6.3.2 Radio resource control information elements

#### – *ConfiguredGrantConfig*

The IE *ConfiguredGrantConfig* is used to configure uplink transmission without dynamic grant according to two possible schemes. The actual uplink grant may either be configured via RRC (*type1*) or provided via the PDCCH (addressed to CS-RNTI) (*type2*). Multiple Configured Grant configurations may be configured in one BWP of a serving cell.

*ConfiguredGrantConfig* information element

-- ASN1START

-- TAG-CONFIGUREDGRANTCONFIG-START

ConfiguredGrantConfig ::= SEQUENCE {

 frequencyHopping ENUMERATED {intraSlot, interSlot} OPTIONAL, -- Need S

 cg-DMRS-Configuration DMRS-UplinkConfig,

 mcs-Table ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 mcs-TableTransformPrecoder ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 uci-OnPUSCH SetupRelease { CG-UCI-OnPUSCH } OPTIONAL, -- Need M

 resourceAllocation ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch },

 rbg-Size ENUMERATED {config2} OPTIONAL, -- Need S

 powerControlLoopToUse ENUMERATED {n0, n1},

 p0-PUSCH-Alpha P0-PUSCH-AlphaSetId,

 transformPrecoder ENUMERATED {enabled, disabled} OPTIONAL, -- Need S

 nrofHARQ-Processes INTEGER(1..16),

 repK ENUMERATED {n1, n2, n4, n8},

 repK-RV ENUMERATED {s1-0231, s2-0303, s3-0000} OPTIONAL, -- Need R

 periodicity ENUMERATED {

 sym2, sym7, sym1x14, sym2x14, sym4x14, sym5x14, sym8x14, sym10x14, sym16x14, sym20x14,

 sym32x14, sym40x14, sym64x14, sym80x14, sym128x14, sym160x14, sym256x14, sym320x14, sym512x14,

 sym640x14, sym1024x14, sym1280x14, sym2560x14, sym5120x14,

 sym6, sym1x12, sym2x12, sym4x12, sym5x12, sym8x12, sym10x12, sym16x12, sym20x12, sym32x12,

 sym40x12, sym64x12, sym80x12, sym128x12, sym160x12, sym256x12, sym320x12, sym512x12, sym640x12,

 sym1280x12, sym2560x12

 },

 configuredGrantTimer INTEGER (1..64) OPTIONAL, -- Need R

 rrc-ConfiguredUplinkGrant SEQUENCE {

 timeDomainOffset INTEGER (0..5119),

 timeDomainAllocation INTEGER (0..15),

 frequencyDomainAllocation BIT STRING (SIZE(18)),

 antennaPort INTEGER (0..31),

 dmrs-SeqInitialization INTEGER (0..1) OPTIONAL, -- Need R

 precodingAndNumberOfLayers INTEGER (0..63),

 srs-ResourceIndicator INTEGER (0..15) OPTIONAL, -- Need R

 mcsAndTBS INTEGER (0..31),

 frequencyHoppingOffset INTEGER (1.. maxNrofPhysicalResourceBlocks-1) OPTIONAL, -- Need R

 pathlossReferenceIndex INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1),

 ...,

 [[

 pusch-RepTypeIndicator-r16 ENUMERATED {pusch-RepTypeA,pusch-RepTypeB} OPTIONAL, -- Need M

 frequencyHoppingPUSCH-RepTypeB-r16 ENUMERATED {interRepetition, interSlot} OPTIONAL, -- Cond RepTypeB

 timeReferenceSFN-r16 ENUMERATED {sfn512} OPTIONAL -- Need S

 ]],

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 pathlossReferenceIndex2-r17 INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1) OPTIONAL, -- Need R

 srs-ResourceIndicator2-r17 INTEGER (0..15) OPTIONAL, -- Need R

 precodingAndNumberOfLayers2-r17 INTEGER (0..63) OPTIONAL, -- Need R

 timeDomainAllocation-v1710 INTEGER (16..63) OPTIONAL, -- Need M

 timeDomainOffset-r17 INTEGER (0..40959) OPTIONAL, -- Need R

 cg-SDT-Configuration-r17 CG-SDT-Configuration-r17 OPTIONAL -- Need M

 ]],

 [[

 srs-ResourceSetId-r18 SRS-ResourceSetId OPTIONAL, -- Need R

 cg-LTM-Configuration-r18 CG-RRC-Configuration-r18 OPTIONAL, -- Cond LTM

 cg-SDT-PeriodicityExt-r18 ENUMERATED {

 sym1x14x1280, sym2x14x1280, sym4x14x1280 , sym8x14x1280, sym16x14x1280,

 sym32x14x1280, sym48x14x1280, sym64x14x1280, sym96x14x1280, sym128x14x1280,

 sym192x14x1280, sym240x14x1280, sym256x14x1280, sym384x14x1280, sym472x14x1280,

 sym480x14x1280, sym512x14x1280, sym768x14x1280, sym944x14x1280, sym960x14x1280,

 sym1408x14x1280, sym1536x14x1280, sym1888x14x1280, sym1920x14x1280,

 sym2816x14x1280, sym3072x14x1280, sym3776x14x1280, sym5632x14x1280,

 sym6144x14x1280, sym7552x14x1280, sym7680x14x1280, sym11264x14x1280,

 sym15104x14x1280, sym15360x14x1280, sym22528x14x1280, sym30208x14x1280,

 sym45056x14x1280, sym60416x14x1280, sym90112x14x1280, sym180224x14x1280,

 sym4x12x1280, sym8x12x1280, sym16x12x1280, sym32x12x1280, sym192x12x1280,

 sym384x12x1280, sym960x12x1280, sym1888x12x1280, sym3776x12x1280,

 sym5632x12x1280, sym11264x12x1280, spare13, spare12, spare11, spare10, spare9,

 spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1

 } OPTIONAL, -- Need R

 timeReferenceHyperSFN-r18 INTEGER (0..1023) OPTIONAL, -- Need R

 cg-RRC-Configuration-r18 CG-RRC-Configuration-r18 OPTIONAL, -- Cond RACH-LessHO

 applyIndicatedTCI-State-r18 ENUMERATED {first, second, both, spare1} OPTIONAL -- Need R

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 } OPTIONAL, -- Need R

 ...,

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 cg-RetransmissionTimer-r16 INTEGER (1..64) OPTIONAL, -- Need R

 cg-minDFI-Delay-r16 ENUMERATED

 {sym7, sym1x14, sym2x14, sym3x14, sym4x14, sym5x14, sym6x14, sym7x14, sym8x14,

 sym9x14, sym10x14, sym11x14, sym12x14, sym13x14, sym14x14,sym15x14, sym16x14

 } OPTIONAL, -- Need R

 cg-nrofPUSCH-InSlot-r16 INTEGER (1..7) OPTIONAL, -- Need R

 cg-nrofSlots-r16 INTEGER (1..40) OPTIONAL, -- Need R

 cg-StartingOffsets-r16 CG-StartingOffsets-r16 OPTIONAL, -- Need R

 cg-UCI-Multiplexing-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 cg-COT-SharingOffset-r16 INTEGER (1..39) OPTIONAL, -- Need R

 betaOffsetCG-UCI-r16 INTEGER (0..31) OPTIONAL, -- Need R

 cg-COT-SharingList-r16 SEQUENCE (SIZE (1..1709)) OF CG-COT-Sharing-r16 OPTIONAL, -- Need R

 harq-ProcID-Offset-r16 INTEGER (0..15) OPTIONAL, -- Need M

 harq-ProcID-Offset2-r16 INTEGER (0..15) OPTIONAL, -- Need M

 configuredGrantConfigIndex-r16 ConfiguredGrantConfigIndex-r16 OPTIONAL, -- Cond CG-List

 configuredGrantConfigIndexMAC-r16 ConfiguredGrantConfigIndexMAC-r16 OPTIONAL, -- Cond CG-IndexMAC

 periodicityExt-r16 INTEGER (1..5120) OPTIONAL, -- Need R

 startingFromRV0-r16 ENUMERATED {on, off} OPTIONAL, -- Need R

 phy-PriorityIndex-r16 ENUMERATED {p0, p1} OPTIONAL, -- Need R

 autonomousTx-r16 ENUMERATED {enabled} OPTIONAL -- Cond LCH-BasedPrioritization

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 cg-betaOffsetsCrossPri0-r17 SetupRelease { BetaOffsetsCrossPriSelCG-r17 } OPTIONAL, -- Need M

 cg-betaOffsetsCrossPri1-r17 SetupRelease { BetaOffsetsCrossPriSelCG-r17 } OPTIONAL, -- Need M

 mappingPattern-r17 ENUMERATED {cyclicMapping, sequentialMapping} OPTIONAL, -- Cond SRSsets

 sequenceOffsetForRV-r17 INTEGER (0..3) OPTIONAL, -- Need R

 p0-PUSCH-Alpha2-r17 P0-PUSCH-AlphaSetId OPTIONAL, -- Need R

 powerControlLoopToUse2-r17 ENUMERATED {n0, n1} OPTIONAL, -- Need R

 cg-COT-SharingList-r17 SEQUENCE (SIZE (1..50722)) OF CG-COT-Sharing-r17 OPTIONAL, -- Need R

 periodicityExt-r17 INTEGER (1..40960) OPTIONAL, -- Need R

 repK-v1710 ENUMERATED {n12, n16, n24, n32} OPTIONAL, -- Need R

 nrofHARQ-Processes-v1700 INTEGER(17..32) OPTIONAL, -- Need M

 harq-ProcID-Offset2-v1700 INTEGER (16..31) OPTIONAL, -- Need R

 configuredGrantTimer-v1700 INTEGER(33..288) OPTIONAL, -- Need R

 cg-minDFI-Delay-v1710 INTEGER (238..3584) OPTIONAL -- Need R

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 harq-ProcID-Offset-v1730 INTEGER (16..31) OPTIONAL, -- Need R

 cg-nrofSlots-r17 INTEGER (1..320) OPTIONAL -- Need R

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 disableCG-RetransmissionMonitoring-r18 ENUMERATED {true} OPTIONAL, -- Need R

 nrofSlotsInCG-Period-r18 INTEGER (2..32) OPTIONAL, -- Need R

 uto-UCI-Config-r18 SEQUENCE {

 nrofBitsInUTO-UCI-r18 INTEGER (3..8),

 betaOffsetUTO-UCI-r18 INTEGER (0..31),

 ...

 } OPTIONAL -- Need R

 ]]

}

CG-UCI-OnPUSCH ::= CHOICE {

 dynamic SEQUENCE (SIZE (1..4)) OF BetaOffsets,

 semiStatic BetaOffsets

}

CG-COT-Sharing-r16 ::= CHOICE {

 noCOT-Sharing-r16 NULL,

 cot-Sharing-r16 SEQUENCE {

 duration-r16 INTEGER (1..39),

 offset-r16 INTEGER (1..39),

 channelAccessPriority-r16 INTEGER (1..4)

 }

}

CG-COT-Sharing-r17 ::= CHOICE {

 noCOT-Sharing-r17 NULL,

 cot-Sharing-r17 SEQUENCE {

 duration-r17 INTEGER (1..319),

 offset-r17 INTEGER (1..319)

 }

}

CG-StartingOffsets-r16 ::= SEQUENCE {

 cg-StartingFullBW-InsideCOT-r16 SEQUENCE (SIZE (1..7)) OF INTEGER (0..6) OPTIONAL, -- Need R

 cg-StartingFullBW-OutsideCOT-r16 SEQUENCE (SIZE (1..7)) OF INTEGER (0..6) OPTIONAL, -- Need R

 cg-StartingPartialBW-InsideCOT-r16 INTEGER (0..6) OPTIONAL, -- Need R

 cg-StartingPartialBW-OutsideCOT-r16 INTEGER (0..6) OPTIONAL -- Need R

}

BetaOffsetsCrossPriSelCG-r17 ::= CHOICE {

 dynamic-r17 SEQUENCE (SIZE (1..4)) OF BetaOffsetsCrossPri-r17,

 semiStatic-r17 BetaOffsetsCrossPri-r17

}

CG-SDT-Configuration-r17 ::= SEQUENCE {

 cg-SDT-RetransmissionTimer INTEGER (1..64) OPTIONAL, -- Need R

 sdt-SSB-Subset-r17 CHOICE {

 shortBitmap-r17 BIT STRING (SIZE (4)),

 mediumBitmap-r17 BIT STRING (SIZE (8)),

 longBitmap-r17 BIT STRING (SIZE (64))

 } OPTIONAL, -- Need S

 sdt-SSB-PerCG-PUSCH-r17 ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen} OPTIONAL, -- Need M

 sdt-P0-PUSCH-r17 INTEGER (-16..15) OPTIONAL, -- Need M

 sdt-Alpha-r17 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need M

 sdt-DMRS-Ports-r17 CHOICE {

 dmrsType1-r17 BIT STRING (SIZE (8)),

 dmrsType2-r17 BIT STRING (SIZE (12))

 } OPTIONAL, -- Need M

 sdt-NrofDMRS-Sequences-r17 INTEGER (1..2) OPTIONAL -- Need M

}

CG-RRC-Configuration-r18 ::= SEQUENCE {

 cg-RRC-RetransmissionTimer-r18 INTEGER (1..288) OPTIONAL, -- Need R

 cg-RRC-RSRP-ThresholdSSB-r18 RSRP-Range OPTIONAL, -- Need R

 rrc-SSB-Subset-r18 CHOICE {

 shortBitmap-r18 BIT STRING (SIZE (4)),

 mediumBitmap-r18 BIT STRING (SIZE (8)),

 longBitmap-r18 BIT STRING (SIZE (64))

 } OPTIONAL, -- Need S

 rrc-SSB-PerCG-PUSCH-r18 ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen} OPTIONAL, -- Need M

 rrc-P0-PUSCH-r18 INTEGER (-16..15) OPTIONAL, -- Need M

 rrc-Alpha-r18 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need M

 rrc-DMRS-Ports-r18 CHOICE {

 dmrsType1-r18 BIT STRING (SIZE (8)),

 dmrsType2-r18 BIT STRING (SIZE (12))

 } OPTIONAL, -- Need M

 rrc-NrofDMRS-Sequences-r18 INTEGER (1..2) OPTIONAL, -- Need M

 ...

}

-- TAG-CONFIGUREDGRANTCONFIG-STOP

-- ASN1STOP

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| *ConfiguredGrantConfig* field descriptions |
| ***antennaPort***Indicates the antenna port(s) to be used for this configuration, and the maximum bitwidth is 5. See TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1. The UE ignores this field in case of CG-SDT or if *cg-RRC-Configuration* is configured. |
| ***applyIndicatedTCI-State***This field indicates, for PUSCH transmission(s) corresponding a Type1-CG configuration, if UE applies the first, the second or both "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 6.1. Network does not configure this field if *cg-RRC-Configuration* is configured. |
| ***autonomousTx***If this field is present, the Configured Grant configuration is configured with autonomous transmission, see TS 38.321 [3]. |
| ***betaOffsetCG-UCI***Beta offset for CG-UCI in CG-PUSCH, see TS 38.213 [13], clause 9.3 |
| ***betaOffsetUTO-UCI***Beta offset value for UTO-UCI multiplexing on CG PUSCH, see TS 38.213 [13], clause 9.3. |
| ***cg-betaOffsetsCrossPri0, cg-betaOffsetsCrossPri1***Selection between and configuration of dynamic and semi-static beta-offset for multiplexing HARQ-ACK in CG-PUSCH with different priorities.The field *cg-betaOffsetsCrossPri0* indicates multiplexing LP HARQ-ACK in HP CG-PUSCH. This field is configured only if *phy-PriorityIndex-r16* is configured with value *p1*.The field *cg-betaOffsetsCrossPri1* indicates multiplexing HP HARQ-ACK in LP CG-PUSCH. This field is configured only if *phy-PriorityIndex-r16* is configured with value *p0*. |
| ***cg-COT-SharingList***Indicates a table for COT sharing combinations (see 37.213 [48], clause 4.1.3). One row of the table can be set to noCOT-Sharing to indicate that there is no channel occupancy sharing. If the *cg-RetransmissionTimer-r16* is configured and the UE operates as an initiating device in semi-static channel access mode (see TS 37.213 [48], clause 4.3), then c*g-COT-SharingList-r16* is configured*.* |
| ***cg-COT-SharingOffset***Indicates the offset from the end of the slot where the COT sharing indication in UCI is enabled where the offset in symbols is equal to 14\*n, where n is the signaled value for *cg-COT-SharingOffset*. Applicable when *ul-toDL-COT-SharingED-Threshold-r16* is not configured (see 37.213 [48], clause 4.1.3). |
| ***cg-DMRS-Configuration***DMRS configuration (see TS 38.214 [19], clause 6.1.2.3). |
| ***cg-minDFI-Delay***Indicates the minimum duration (in unit of symbols) from the ending symbol of the PUSCH to the starting symbol of the PDCCH containing the downlink feedback indication (DFI) carrying HARQ-ACK for this PUSCH. The HARQ-ACK received before this minimum duration is not considered as valid for this PUSCH (see TS 38.213 [13], clause 10.5). The following minimum duration values are supported, depending on the configured subcarrier spacing [symbols]:15 kHz: 7, m\*14, where m = {1, 2, 3, 4}30 kHz: 7, m\*14, where m = {1, 2, 3, 4, 5, 6, 7, 8}60 kHz: 7, m\*14, where m = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}120 kHz: 7, m\*14, where m = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32}480 kHz: m\*14, where m = {2, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108, 112, 116, 120, 124, 128}960 kHz: m\*14, where m = {4, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184, 192, 200, 208, 216, 224, 232, 240, 248, 256} |
| ***cg-nrofPUSCH-InSlot***Indicates the number of consecutive PUSCH configured to CG within a slot where the SLIV indicating the first PUSCH and additional PUSCH appended with the same length (see TS 38.214 [19], clause 6.1.2.3). The network can only configure this field if *cg-RetransmissionTimer* is configured. |
| ***cg-nrofSlots***Indicates the number of allocated slots in a configured grant periodicity following the time instance of configured grant offset (see TS 38.214 [19], clause 6.1.2.3). *cg-nrofSlots-r17* is only applicable for operation with shared spectrum channel access in FR2-2. When *cg-nrofSlots-r17* is configured, the UE shall ignore *cg-nrofSlots-r16*. The network can only configure this field if *cg-RetransmissionTimer* is configured. |
| ***cg-RetransmissionTimer***Indicates the initial value of the configured retransmission timer (see TS 38.321 [3]) in multiples of *periodicity*. The value of *cg-RetransmissionTimer* is always less than or equal to the value of *configuredGrantTimer.* This field is always configured together with *harq-ProcID-Offset*. This field is not configured for operation in licensed spectrum or simultaneously with *harq-ProcID-Offset2.* The network does not configure this field for CG-SDT. |
| ***cg-SDT-PeriodicityExt***This field is used to calculate the periodicity for UL transmission without UL grant for type 1 (see TS 38.321 [3], clause 5.8.2) for extended CG-SDT periodicities. If this field is present, the fields *periodicity* and periodicityExt are ignored.The following periodicities are supported depending on the configured subcarrier spacing [symbols]:15 kHz: n\*14\*1280, where n={1, 2, 4, 8, 48, 96, 240, 472, 944, 1408, 2816}30 kHz: n\*14\*1280, where n={2, 4, 8, 16, 96, 192, 480, 944, 1888, 2816, 5632}60 kHz with normal CP n\*14\*1280, where n={4, 8, 16, 32, 192, 384, 960, 1888, 3776, 5632,11264}60 kHz with ECP: n\*12\*1280, where n={4, 8, 16, 32, 192, 384, 960, 1888, 3776, 5632,11264}120 kHz: n\*14\*1280, where n={8, 16, 32, 64, 384, 768, 1920, 3776, 7552, 11264, 22528}480 kHz: n\*14\*1280, where n={32, 64, 128, 256, 1536, 3072, 7680, 15104, 30208, 45056, 90112}960 kHz: n\*14\*1280, where n={64, 128, 256, 512, 3072, 6144, 15360, 30208, 60416, 90112, 180224} |
| ***cg-StartingOffsets***This field is not applicable for a UE which is allowed to operate as an initiating device in semi-static channel access mode, i.e., not applicable for a UE configured with UE FFP parameters (e.g. period, offset) regardless whether the UE would initiate its own COT or would share gNB's COT. |
| ***cg-UCI-Multiplexing***If present, this field indicates that in the case of PUCCH overlapping with CG-PUSCH(s) including CG-UCI within a PUCCH group, HARQ-ACK is multiplexed on the CG-PUSCH including CG-UCI (see TS 38.213 [13], clause 9). |
| ***configuredGrantConfigIndex***Indicates the index of the Configured Grant configurations within the BWP. |
| ***configuredGrantConfigIndexMAC***Indicates the index of the Configured Grant configurations within the MAC entity. |
| ***disableCG-RetransmissionMonitoring***Indicates that the UE shall disable waking-up to monitor possible grants for retransmissions corresponding to this *ConfiguredGrantConfig* when DRX is configured. When this field is configured, the UE does not start the *drx-HARQ-RTT-TimerUL* for PUSCH transmissions using configured uplink grants corresponding to this *ConfiguredGrantConfig*. See TS 38.321 [3], clause 5.7. |
| ***configuredGrantTimer***Indicates the initial value of the configured grant timer (see TS 38.321 [3]) in multiples of periodicity. When *cg-RetransmissonTimer* is configured, if HARQ processes are shared among different configured grants on the same BWP, *configuredGrantTimer \* periodicity* is set to the same value for the configurations that share HARQ processes on this BWP. The value of the extension *configuredGrantTimer* is 2 times the configured value. |
| ***dmrs-SeqInitialization***The network configures this field if *transformPrecoder* is disabled or when the value of *sdt-NrofDMRS-Sequences* is set to 1. Otherwise, the field is absent. |
| ***frequencyDomainAllocation***Indicates the frequency domain resource allocation, see TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1). |
| ***frequencyHopping***The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured. The field *frequencyHopping* applies to configured grant for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3.1). |
| ***frequencyHoppingOffset***Frequency hopping offset used when frequency hopping is enabled (see TS 38.214 [19], clause 6.1.2 and clause 6.3). |
| ***frequencyHoppingPUSCH-RepTypeB***Indicates the frequency hopping scheme for Type 1 CG when *pusch-RepTypeIndicator* is set to 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1). The value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, the frequency hopping is not enabled for Type 1 CG. |
| ***harq-ProcID-Offset***For operation with shared spectrum channel access configured with *cg-RetransmissionTimer-r16*, this configures the range of HARQ process IDs which can be used for this configured grant where the UE can select a HARQ process ID within [*harq-procID-offset, ..,* (*harq-procID-offset + nrofHARQ-Processes* – 1)]. *harq-ProcID-Offset-v1730* is only applicable for operation with shared spectrum channel access in FR2-2*.* If the field *harq-ProcID-Offset-v1730* is present, the UE shall ignore the *harq-ProcID-Offset-r16*. The network does not configure this field for CG-SDT. |
| ***harq-ProcID-Offset2***Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.4.1. This field is not configured together with *cg-RetransmissionTimer-r16*. If the field *harq-ProcID-Offset2-v1700* is present, the UE shall ignore the *harq-ProcID-Offset2-r16*. |
| ***mappingPattern***Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern when two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook' for PUSCH transmission with a Type 1 configured grant and/or a Type 2 configured grant as described in clause 6.1.2.3 of TS 38.214 [19] |
| ***mcs-Table***Indicates the MCS table the UE shall use for PUSCH without transform precoding. If the field is absent the UE applies the value *qam64*. |
| ***mcs-TableTransformPrecoder***Indicates the MCS table the UE shall use for PUSCH with transform precoding. If the field is absent the UE applies the value *qam64*. |
| ***mcsAndTBS***The modulation order, target code rate and TB size (see TS 38.214 [19], clause 6.1.2). The NW does not configure the values 28~31 in this version of the specification. |
| ***nrofBitsInUTO-UCI***Indicates the number of bits in the UTO-UCI bitmap (see TS 38.212 [17], clause 6.2.7, 6.3.2, TS 38.213 [13], clause 9.3.1, TS 38.214 [19], clause 5.2.3). When this field is configured, UTO-UCI is enabled for the UE. |
| ***nrofHARQ-Processes***The number of HARQ processes configured. It applies for both Type 1 and Type 2. See TS 38.321 [3], clause 5.4.1. If the UE is configured with *nrofHARQ-Processes-v1700, the* UE shall ignore *nrofHARQ-Processes (without suffix)*. |
| ***nrofSlotsInCG-Period***Number of consecutive slots for CG PUSCH transmission occasions in a period of a single CG PUSCH configuration, see TS 38.214 [19], clause 6.1. The network does not configure this field for operation on shared spectrum. |
| ***pathlossReferenceIndex***Indicates the reference signal index used as PUSCH pathloss reference (see TS 38.213 [13], clause 7.1.1). In case of CG-SDT or if *cg-RRC-Configuration* is configured, the UE does not use this field. |
| ***pathlossReferenceIndex2***Indicates the reference signal used as PUSCH pathloss reference for the second SRS resource set. When this field is present, pathlossReferenceIndex indicates the reference signal used as PUSCH pathloss reference for the first SRS resource set. Network does not configure this field if *cg-RRC-Configuration* is configured. |
| ***p0-PUSCH-Alpha***Index of the *P0-PUSCH-AlphaSet* to be used for this configuration. |
| ***p0-PUSCH-Alpha2***Index of the *P0-PUSCH-AlphaSet* to be used for second SRS resource set. If this field is present, the *p0-PUSCH-Alpha* provides index for the P0-PUSCH-AlphaSet to be used for first SRS resource set. |
| ***periodicity***Periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5.8.2).The following periodicities are supported depending on the configured subcarrier spacing [symbols]:15 kHz: 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 320, 640}30 kHz: 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 640, 1280}60 kHz with normal CP 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560}60 kHz with ECP: 2, 6, n\*12, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560}120 kHz: 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120}480 and 960 kHz: n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120}In case of SDT, the network does not configure periodicity values less than 5ms. |
| ***periodicityExt***This field is used to calculate the periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5.8.2). If this field is present, the UE shall ignore field *periodicity* (without suffix). Network does not configure *periodicityExt-r17* together with *periodicityExt-r16*.The following periodicites are supported depending on the configured subcarrier spacing [symbols]:15 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 640.30 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 1280.60 kHz with normal CP: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 2560.60 kHz with ECP: *periodicityExt*\*12, where *periodicityExt* has a value between 1 and 2560.120 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 5120.480 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 20480.960 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 40960.In case of SDT, the network does not configure periodicity values less than 5ms. |
| ***phy-PriorityIndex***Indicates the PHY priority of CG PUSCH at least for PHY-layer collision handling. Value *p0* indicates low priority and value *p1* indicates high priority. The network does not configure this for CG-SDT. |
| ***powerControlLoopToUse***Closed control loop to apply (see TS 38.213 [13], clause 7.1.1). |
| ***powerControlLoopToUse2***Closed control loop to apply to second SRS resource set (see TS 38.213 [13], clause 7.1.1). If this field is present, the *powerControlLoopToUse* applies to the first SRS resource set. |
| ***precodingAndNumberOfLayers***Indicates the precoding and number of layers (see TS 38.212 [17], clause 7.3.1.1.2, and TS 38.214 [19], clause 6.1.2.3). In case of CG-SDT or if *cg-RRC-Configuration* is configured, network sets this field to 1. |
| ***precodingAndNumberOfLayers2***Indicates the precoding and number of layers for the second SRS resource set. When this field is present, *precodingAndNumberOfLayers* indicated the precoding and number of layers for the first SRS resource set. Network does not configure this field if *cg-RRC-Configuration* is configured. |
| ***pusch-RepTypeIndicator***Indicates whether UE follows the behavior for PUSCH repetition type A or the behavior for PUSCH repetition type B for each Type 1 configured grant configuration. The value *pusch-RepTypeA* enables the 'PUSCH repetition type A' and the value *pusch-RepTypeB* enables the 'PUSCH repetition type B' (see TS 38.214 [19], clause 6.1.2.3). The value *pusch-RepTypeB* is not configured simultaneously with *nrofSlotsInCG-Period-r18*. The network does not configure this field if *cg-RetransmissionTimer-r16* is configured for CG operation with shared spectrum channel access. |
| ***rbg-Size***Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent. Note: *rbg-Size* is used when the *transformPrecoder* parameter is disabled. |
| ***repK-RV***The redundancy version (RV) sequence to use. See TS 38.214 [19], clause 6.1.2. The network configures this field if repetitions are used, i.e., if *repK* is set to *n2*, *n4* or *n8*. This field is not configured when *cg-RetransmissionTimer* is configured. Otherwise, the field is absent. |
| ***repK***Number of repetitions K, see TS 38.214 [19]. If the field *repK-v1710* is present, the UE shall ignore the *repK* (without suffix). |
| ***resourceAllocation***Configuration of resource allocation type 0 and resource allocation type 1. For Type 1 UL data transmission without grant, *resourceAllocation* should be *resourceAllocationType0* or *resourceAllocationType1*. |
| ***rrc-ConfiguredUplinkGrant***Configuration for "configured grant" transmission with fully RRC-configured UL grant (Type1). If this field is absent the UE uses UL grant configured by DCI addressed to CS-RNTI (Type2). |
| ***sequenceOffsetForRV***Configures the RV offset for the starting RV for the first repetition (first actual repetition in PUSCH repetition Type B) towards the second 'SRS resource set' for PUSCH configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook'. |
| ***srs-ResourceSetId***Indicates the associated SRS resource set for PUSCH+PUSCH simultaneous uplink transmsision for CG-type 1 PUSCH. Network does not configure this field if *cg-RRC-Configuration* is configured. |
| ***srs-ResourceIndicator***Indicates the SRS resource to be used. The network does not configure this for CG-SDT or if *cg-RRC-Configuration* is configured. |
| ***srs-ResourceIndicator2***Indicates the SRS resource to be used for the second SRS resource set. When this field is present, the srs-ResourceIndicator is used for the first SRS resource set. Network does not configure this field if *cg-RRC-Configuration* is configured. |
| ***startingFromRV0***This field is used to determine the initial transmission occasion of a transport block for a given RV sequence, see TS 38.214 [19], clause 6.1.2.3.1. The network does not configure this field if *cg-RetransmissionTimer-r16* is configured for CG operation. |
| ***timeDomainAllocation, timeDomainAllocation-v1710***Indicates a combination of start symbol and length and PUSCH mapping type, see TS 38.214 [19], clause 6.1.2 and TS 38.212 [17], clause 7.3.1.If the field *timeDomainAllocation-v1710* is present, the UE shall ignore *timeDomainAllocation* field (without suffix). |
| ***timeDomainOffset***Offset related to the reference SFN indicated by *timeReferenceSFN*, see TS 38.321 [3], clause 5.8.2. *timeDomainOffset-r17* is only applicable to 480 kHz and 960 kHz. If *timeDomainOffset-r17* is present, the UE shall ignore *timeDomainOffset* (without suffix). |
| ***timeReferenceHyperSFN***Indicates H-SFN used for determination of the offset of a resource in time domain. The UE uses the closest H-SFN with the indicated number preceding the reception of the configured grant configuration, see TS 38.321 [3], clause 5.8.2. |
| ***timeReferenceSFN***Indicates SFN used for determination of the offset of a resource in time domain. The UE uses the closest SFN with the indicated number preceding the reception of the configured grant configuration, see TS 38.321 [3], clause 5.8.2. If the field *timeReferenceSFN* is not present, the reference SFN is 0. |
| ***transformPrecoder***Enables or disables transform precoding for *type1* and *type2*. If the field is absent, the UE enables or disables transform precoding in accordance with the field *msg3-transformPrecoder* in *RACH-ConfigCommon* from *rach-ConfigCommon* included directly within BWP configuration (i.e., not included in *additionalRACH-ConfigList*), see TS 38.214 [19], clause 6.1.3. |
| ***uci-OnPUSCH***Selection between and configuration of dynamic and semi-static beta-offset. For Type 1 UL data transmission without grant, *uci-OnPUSCH* should be set to *semiStatic.* The network does not configure this for CG-SDT. |

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| *CG-COT-Sharing* field descriptions |
| ***channelAccessPriority***Indicates the Channel Access Priority Class that the gNB can assume when sharing the UE initiated COT (see 37.213 [48], clause 4.1.3). |
| ***duration***Indicates the number of DL transmission slots within UE initiated COT (see 37.213 [48], clause 4.1.3). |
| ***offset***Indicates the number of DL transmission slots from the end of the slot where CG-UCI is detected after which COT sharing can be used (see 37.213 [48], clause 4.1.3). |

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| *CG-StartingOffsets* field descriptions |
| ***cg-StartingFullBW-InsideCOT***A set of configured grant PUSCH transmission starting offsets (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation includes all interlaces in the allocated RB set(s) and the CG PUSCH resource is inside gNB COT (see TS 38.214 [19], clause 6.1.2.3). |
| ***cg-StartingFullBW-OutsideCOT***A set of configured grant PUSCH transmission starting offset indices (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation includes all interlaces in the allocated RB set(s) and the CG PUSCH resource is outside gNB COT (see TS 38.214 [19], clause 6.1.2.3). |
| ***cg-StartingPartialBW-InsideCOT***A set of configured grant PUSCH transmission starting offset index (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation does not include all interlaces in the allocated RB set(s) and the CG PUSCH resource is inside gNB COT (see TS 38.214 [19], clause 6.1.2.3). |
| ***cg-StartingPartialBW-OutsideCOT***A set of configured grant PUSCH transmission starting offset index (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation does not include all interlaces in the allocated RB set(s) and the CG PUSCH resource is outside gNB COT (see TS 38.214 [19], clause 6.1.2.3). |

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| *CG-SDT-Configuration* and *CG-RRC-Configuration* field descriptions |
| ***cg-RRC-RSRP-ThresholdSSB***An RSRP threshold configured for SSB selection for the CG as specified in TS 38.321 [3]. This field is absent in case *CG-RRC-Configuration* IE is received as part of an LTM-Candidate IE. |
| ***cg-SDT-RetransmissionTimer, cg-RRC-RetransmissionTimer***Indicates the initial value of the configured grant retransmission timer used for the initial transmission of CG with CCCH (for CG-SDT) or DCCH message (see TS 38.321 [3]) in multiples of *periodicity*. The field *cg-RRC-RetransmissionTimer* is not configured together with the field *harq-ProcID-Offset* for operations in unlicensed spectrum. |
| ***sdt-DMRS-Ports, rrc-DMRS-Ports***Indicates the set of DMRS ports for SSB to PUSCH mapping (see TS 38.213 [13]). The first (left-most / most significant) bit corresponds to DMRS port 0, the second most significant bit corresponds to DMRS port 1, and so on. A bit set to 1 indicates that this DMRS port is used for mapping. In case of an RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB. |
| ***sdt-NrofDMRS-Sequences, rrc-NrofDMRS-Sequences***Indicates the number of DMRS sequences for SSB to PUSCH mapping (see TS 38.213 [13]). In case of an RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB. |
| ***sdt-SSB-Subset, rrc-SSB-Subset***Indicates SSB subset for SSB to CG PUSCH mapping within one CG configuration. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not included in the SSB subset for SSB to CG PUSCH mapping while value 1 indicates that the corresponding SS/PBCH block is included in SSB subset for SSB to CG PUSCH mapping. If this field is absent, UE assumes the SSB set includes all actually transmitted SSBs. In case of an RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB. |
| ***sdt-SSB-PerCG-PUSCH, rrc-SSB-PerCG-PUSCH***The number of SSBs per CG PUSCH (see TS 38.213 [13]). Value *one* corresponds to 1 SSBs per CG PUSCH, value *two* corresponds to 2 SSBs per CG PUSCH and so on. In case of an RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB. |
| ***sdt-P0-PUSCH, rrc-P0-PUSCH***Indicates P0 value for PUSCH in steps of 1dB (see TS 38.213 [13]). When this field is configured, the UE ignores the *p0-PUSCH-Alpha*. |
| ***sdt-Alpha, rrc-Alpha***Indicates alpha value for PUSCH. *alpha0* indicates value 0 is used, *alpha04* indicates value 4 is used and so on (see TS 38.213 [13]). When this field is configured, the UE ignores the *p0-PUSCH-Alpha*. |

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| Conditional Presence | Explanation |
| *LCH-BasedPrioritization* | This field is optionally present, Need R, if *lch-BasedPrioritization* is configured in the MAC entity. It is absent otherwise. |
| *RACH-LessHO* | The field is optionally present, Need N, if *rach-LessHO* is present in *reconfigurationWithSync*. It is absent otherwise. |
| *RepTypeB* | The field is optionally present if pusch-RepTypeIndicator is set to pusch-RepTypeB, Need S, and absent otherwise. |
| *CG-List* | The field is mandatory present when included in *configuredGrantConfigToAddModList-r16*, otherwise the field is absent. |
| *CG-IndexMAC* | The field is mandatory present if at least one configured grant is configured by *configuredGrantConfigToAddModList-r16* in any BWP of this MAC entity, otherwise it is optionally present, need R. |
| *LTM* | The field is optionally present, Need R, if the UE is configured with at least an LTM candidate configuration. Otherwise, the field is absent. |
| *SRSsets* | This field is mandatory present when UE is configured with two SRS sets configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage codebook or non-codebook and none of *multipanelSchemeSDM* or *multipanelSchemeSFN* or *sTx-2Panel* is configured. Otherwise it is absent, Need R |

#### – *PUSCH-Config*

The IE *PUSCH-Config* is used to configure the UE specific PUSCH parameters applicable to a particular BWP.

*PUSCH-Config* information element

-- ASN1START

-- TAG-PUSCH-CONFIG-START

PUSCH-Config ::= SEQUENCE {

 dataScramblingIdentityPUSCH INTEGER (0..1023) OPTIONAL, -- Need S

 txConfig ENUMERATED {codebook, nonCodebook} OPTIONAL, -- Need S

 dmrs-UplinkForPUSCH-MappingTypeA SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

 dmrs-UplinkForPUSCH-MappingTypeB SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

 pusch-PowerControl PUSCH-PowerControl OPTIONAL, -- Need M

 frequencyHopping ENUMERATED {intraSlot, interSlot} OPTIONAL, -- Need S

 frequencyHoppingOffsetLists SEQUENCE (SIZE (1..4)) OF INTEGER (1.. maxNrofPhysicalResourceBlocks-1)

 OPTIONAL, -- Need M

 resourceAllocation ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},

 pusch-TimeDomainAllocationList SetupRelease { PUSCH-TimeDomainResourceAllocationList } OPTIONAL, -- Need M

 pusch-AggregationFactor ENUMERATED { n2, n4, n8 } OPTIONAL, -- Need S

 mcs-Table ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 mcs-TableTransformPrecoder ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 transformPrecoder ENUMERATED {enabled, disabled} OPTIONAL, -- Need S

 codebookSubset ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent,nonCoherent}

 OPTIONAL, -- Cond codebookBased

 maxRank INTEGER (1..4) OPTIONAL, -- Cond codebookBased

 rbg-Size ENUMERATED { config2} OPTIONAL, -- Need S

 uci-OnPUSCH SetupRelease { UCI-OnPUSCH} OPTIONAL, -- Need M

 tp-pi2BPSK ENUMERATED {enabled} OPTIONAL, -- Need S

 ...,

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 minimumSchedulingOffsetK2-r16 SetupRelease { MinSchedulingOffsetK2-Values-r16 } OPTIONAL, -- Need M

 ul-AccessConfigListDCI-0-1-r16 SetupRelease { UL-AccessConfigListDCI-0-1-r16 } OPTIONAL, -- Need M

 -- Start of the parameters for DCI format 0\_2 introduced in V16.1.0

 harq-ProcessNumberSizeDCI-0-2-r16 INTEGER (0..4) OPTIONAL, -- Need R

 dmrs-SequenceInitializationDCI-0-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 numberOfBitsForRV-DCI-0-2-r16 INTEGER (0..2) OPTIONAL, -- Need R

 antennaPortsFieldPresenceDCI-0-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2-r16 SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

 dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2-r16 SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

 frequencyHoppingDCI-0-2-r16 CHOICE {

 pusch-RepTypeA ENUMERATED {intraSlot, interSlot},

 pusch-RepTypeB ENUMERATED {interRepetition, interSlot}

 } OPTIONAL, -- Need S

 frequencyHoppingOffsetListsDCI-0-2-r16 SetupRelease { FrequencyHoppingOffsetListsDCI-0-2-r16} OPTIONAL, -- Need M

 codebookSubsetDCI-0-2-r16 ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent,nonCoherent}

 OPTIONAL, -- Cond codebookBased

 invalidSymbolPatternIndicatorDCI-0-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 maxRankDCI-0-2-r16 INTEGER (1..4) OPTIONAL, -- Cond codebookBased

 mcs-TableDCI-0-2-r16 ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 mcs-TableTransformPrecoderDCI-0-2-r16 ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 priorityIndicatorDCI-0-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 pusch-RepTypeIndicatorDCI-0-2-r16 ENUMERATED { pusch-RepTypeA, pusch-RepTypeB} OPTIONAL, -- Need R

 resourceAllocationDCI-0-2-r16 ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch}

 OPTIONAL, -- Need M

 resourceAllocationType1GranularityDCI-0-2-r16 ENUMERATED { n2,n4,n8,n16 } OPTIONAL, -- Need S

 uci-OnPUSCH-ListDCI-0-2-r16 SetupRelease { UCI-OnPUSCH-ListDCI-0-2-r16} OPTIONAL, -- Need M

 pusch-TimeDomainAllocationListDCI-0-2-r16 SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }

 OPTIONAL, -- Need M

 -- End of the parameters for DCI format 0\_2 introduced in V16.1.0

 -- Start of the parameters for DCI format 0\_1 introduced in V16.1.0

 pusch-TimeDomainAllocationListDCI-0-1-r16 SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }

 OPTIONAL, -- Need M

 invalidSymbolPatternIndicatorDCI-0-1-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 priorityIndicatorDCI-0-1-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 pusch-RepTypeIndicatorDCI-0-1-r16 ENUMERATED { pusch-RepTypeA, pusch-RepTypeB} OPTIONAL, -- Need R

 frequencyHoppingDCI-0-1-r16 ENUMERATED {interRepetition, interSlot} OPTIONAL, -- Cond RepTypeB

 uci-OnPUSCH-ListDCI-0-1-r16 SetupRelease { UCI-OnPUSCH-ListDCI-0-1-r16 } OPTIONAL, -- Need M

 -- End of the parameters for DCI format 0\_1 introduced in V16.1.0

 invalidSymbolPattern-r16 InvalidSymbolPattern-r16 OPTIONAL, -- Need S

 pusch-PowerControl-v1610 SetupRelease {PUSCH-PowerControl-v1610} OPTIONAL, -- Need M

 ul-FullPowerTransmission-r16 ENUMERATED {fullpower, fullpowerMode1, fullpowerMode2} OPTIONAL, -- Need R

 pusch-TimeDomainAllocationListForMultiPUSCH-r16 SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }

 OPTIONAL, -- Need M

 numberOfInvalidSymbolsForDL-UL-Switching-r16 INTEGER (1..4) OPTIONAL -- Cond RepTypeB2

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 ul-AccessConfigListDCI-0-2-r17 SetupRelease { UL-AccessConfigListDCI-0-2-r17 } OPTIONAL, -- Need M

 betaOffsetsCrossPri0-r17 SetupRelease { BetaOffsetsCrossPriSel-r17 } OPTIONAL, -- Need M

 betaOffsetsCrossPri1-r17 SetupRelease { BetaOffsetsCrossPriSel-r17 } OPTIONAL, -- Need M

 betaOffsetsCrossPri0DCI-0-2-r17 SetupRelease { BetaOffsetsCrossPriSelDCI-0-2-r17 } OPTIONAL, -- Need M

 betaOffsetsCrossPri1DCI-0-2-r17 SetupRelease { BetaOffsetsCrossPriSelDCI-0-2-r17 } OPTIONAL, -- Need M

 mappingPattern-r17 ENUMERATED {cyclicMapping, sequentialMapping} OPTIONAL, -- Cond SRSsets

 secondTPCFieldDCI-0-1-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 secondTPCFieldDCI-0-2-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 sequenceOffsetForRV-r17 INTEGER (0..3) OPTIONAL, -- Need R

 ul-AccessConfigListDCI-0-1-r17 SetupRelease { UL-AccessConfigListDCI-0-1-r17 } OPTIONAL, -- Need M

 minimumSchedulingOffsetK2-r17 SetupRelease { MinSchedulingOffsetK2-Values-r17 } OPTIONAL, -- Need M

 availableSlotCounting-r17 ENUMERATED { enabled } OPTIONAL, -- Need S

 dmrs-BundlingPUSCH-Config-r17 SetupRelease { DMRS-BundlingPUSCH-Config-r17 } OPTIONAL, -- Need M

 harq-ProcessNumberSizeDCI-0-2-v1700 INTEGER (5) OPTIONAL, -- Need R

 harq-ProcessNumberSizeDCI-0-1-r17 INTEGER (5) OPTIONAL, -- Need R

 mpe-ResourcePoolToAddModList-r17 SEQUENCE (SIZE(1..maxMPE-Resources-r17)) OF MPE-Resource-r17 OPTIONAL, -- Need N

 mpe-ResourcePoolToReleaseList-r17 SEQUENCE (SIZE(1..maxMPE-Resources-r17)) OF MPE-ResourceId-r17 OPTIONAL -- Need N

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 maxRank-v1810 INTEGER (5..8) OPTIONAL, -- Need R

 sTx-2Panel-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 multipanelSchemeSDM-r18 SDM-Scheme-r18 OPTIONAL, -- Need R

 multipanelSchemeSFN-r18 SFN-Scheme-r18 OPTIONAL, -- Need R

 codebookTypeUL-r18 SetupRelease { CodebookTypeUL-r18 } OPTIONAL, -- Need M

 applyIndicatedTCI-State-r18 ENUMERATED {first, second} OPTIONAL, -- Need R

 dynamicTransformPrecoderFieldPresenceDCI-0-1-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 dynamicTransformPrecoderFieldPresenceDCI-0-2-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pusch-ConfigDCI-0-3-r18 SetupRelease { PUSCH-ConfigDCI-0-3-r18 } OPTIONAL -- Need M

 ]]

}

UCI-OnPUSCH ::= SEQUENCE {

 betaOffsets CHOICE {

 dynamic SEQUENCE (SIZE (4)) OF BetaOffsets,

 semiStatic BetaOffsets

 } OPTIONAL, -- Need M

 scaling ENUMERATED { f0p5, f0p65, f0p8, f1 }

}

MinSchedulingOffsetK2-Values-r16 ::= SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK2-SchedulingOffset-r16)

MinSchedulingOffsetK2-Values-r17 ::= SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK2-SchedulingOffset-r17)

UCI-OnPUSCH-DCI-0-2-r16 ::= SEQUENCE {

 betaOffsetsDCI-0-2-r16 CHOICE {

 dynamicDCI-0-2-r16 CHOICE {

 oneBit-r16 SEQUENCE (SIZE (2)) OF BetaOffsets,

 twoBits-r16 SEQUENCE (SIZE (4)) OF BetaOffsets

 },

 semiStaticDCI-0-2-r16 BetaOffsets

 } OPTIONAL, -- Need M

 scalingDCI-0-2-r16 ENUMERATED { f0p5, f0p65, f0p8, f1 }

}

FrequencyHoppingOffsetListsDCI-0-2-r16 ::= SEQUENCE (SIZE (1..4)) OF INTEGER (1.. maxNrofPhysicalResourceBlocks-1)

UCI-OnPUSCH-ListDCI-0-2-r16 ::= SEQUENCE (SIZE (1..2)) OF UCI-OnPUSCH-DCI-0-2-r16

UCI-OnPUSCH-ListDCI-0-1-r16 ::= SEQUENCE (SIZE (1..2)) OF UCI-OnPUSCH

UL-AccessConfigListDCI-0-1-r16 ::= SEQUENCE (SIZE (1..64)) OF INTEGER (0..63)

UL-AccessConfigListDCI-0-1-r17 ::= SEQUENCE (SIZE (1..3)) OF INTEGER (0..2)

UL-AccessConfigListDCI-0-2-r17 ::= SEQUENCE (SIZE (1..64)) OF INTEGER (0..63)

BetaOffsetsCrossPriSel-r17 ::= CHOICE {

 dynamic-r17 SEQUENCE (SIZE (4)) OF BetaOffsetsCrossPri-r17,

 semiStatic-r17 BetaOffsetsCrossPri-r17

}

BetaOffsetsCrossPriSelDCI-0-2-r17 ::= CHOICE {

 dynamicDCI-0-2-r17 CHOICE {

 oneBit-r17 SEQUENCE (SIZE (2)) OF BetaOffsetsCrossPri-r17,

 twoBits-r17 SEQUENCE (SIZE (4)) OF BetaOffsetsCrossPri-r17

 },

 semiStaticDCI-0-2-r17 BetaOffsetsCrossPri-r17

}

MPE-Resource-r17 ::= SEQUENCE {

 mpe-ResourceId-r17 MPE-ResourceId-r17,

 cell-r17 ServCellIndex OPTIONAL, -- Need R

 additionalPCI-r17 AdditionalPCIIndex-r17 OPTIONAL, -- Need R

 mpe-ReferenceSignal-r17 CHOICE {

 csi-RS-Resource-r17 NZP-CSI-RS-ResourceId,

 ssb-Resource-r17 SSB-Index

 }

}

MPE-ResourceId-r17 ::= INTEGER (1..maxMPE-Resources-r17)

SDM-Scheme-r18 ::= SEQUENCE {

 maxRankSDM-r18 INTEGER (1..2) OPTIONAL, -- Need R

 maxRankSDM-DCI-0-2-r18 INTEGER (1..2) OPTIONAL -- Need R

}

SFN-Scheme-r18 ::= SEQUENCE {

 maxRankSFN-r18 INTEGER (1..2) OPTIONAL, -- Need R

 maxRankSFN-DCI-0-2-r18 INTEGER (1..2) OPTIONAL -- Need R

}

CodebookTypeUL-r18 ::= CHOICE {

 codebook1-r18 ENUMERATED {ng1n4n1, ng1n2n2},

 codebook2-r18 ENUMERATED {ng2},

 codebook3-r18 ENUMERATED {ng4},

 codebook4-r18 ENUMERATED {ng8}

}

PUSCH-ConfigDCI-0-3-r18 ::= SEQUENCE {

 resourceAllocationDCI-0-3-r18 ENUMERATED {resourceAllocationType0, resourceAllocationType1, dynamicSwitch}

 OPTIONAL, -- Need M

 rbg-SizeDCI-0-3-r18 ENUMERATED {config2, config3} OPTIONAL, -- Need S

 resourceAllocationType1GranularityDCI-0-3-r18 ENUMERATED {n2,n4,n8,n16} OPTIONAL, -- Need S

 numberOfBitsForRV-DCI-0-3-r18 INTEGER (0..2) OPTIONAL, -- Need R

 harq-ProcessNumberSizeDCI-0-3-r18 INTEGER (0..5) OPTIONAL, -- Need R

 uci-OnPUSCH-ListDCI-0-3-r18 SetupRelease { UCI-OnPUSCH-ListDCI-0-1-r16 } OPTIONAL -- Need M

}

-- TAG-PUSCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *PUSCH-Config* field descriptions |
| ***antennaPortsFieldPresenceDCI-0-2***Configure the presence of "Antenna ports" field in DCI format 0\_2. When the field is configured, then the "Antenna ports" field is present in DCI format 0\_2. Otherwise, the field size is set to 0 for DCI format 0\_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* nor *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* is configured, this field is absent. |
| ***applyIndicatedTCI-State***This field indicates, for a PUSCH transmission, if UE applies the first or the second "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 6.1. |
| ***availableSlotCounting***Indicate whether PUSCH repetitions counted on the basis of available slots is enabled. If the field is absent, PUSCH repetitions counted on the basis of available slots is disabled. |
| ***betaOffsetsCrossPri0, betaOffsetsCrossPri1,*** ***betaOffsetsCrossPri0DCI-0-2, betaOffsetsCrossPri1DCI-0-2***Selection between and configuration of dynamic and semi-static beta-offset for multiplexing HARQ-ACK on dynamically scheduled PUSCH with different priorities, see TS 38.213 [13], clause 9.3.The field *betaOffsetsCrossPrio0* indicates multiplexing low priority (LP) HARQ-ACK on dynamically scheduled high priority (HP) PUSCH.The field *betaOffsetsCrossPrio1* indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH.The field *betaOffsetsCrossPrio0DCI-0-2* indicates multiplexing LP HARQ-ACK on dynamically scheduled HP PUSCH by DCI format 0\_2.The field *betaOffsetsCrossPrio1DCI-0-2* indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH by DCI format 0\_2. |
| ***codebookSubset, codebookSubsetDCI-0-2***Subset of PMIs addressed by TPMI, where PMIs are those supported by UEs with maximum coherence capabilities (see TS 38.214 [19], clause 6.1.1.1). The field *codebookSubset* applies to DCI formats 0\_1 and 0\_3, and the field *codebookSubsetDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.1.1). |
| ***codebookTypeUL***Configures a codebook and the corresponding number of antenna port groups for codebook-based transmission of PUSCH with 8 antenna ports, see TS 38.211 [16], tables 6.3.1.5-9 to 6.3.1.5-47, and table 6.3.1.5-8 respectively). The values *ng1n4n1* and *ng1n2n2* correspond to codebooks with one antenna port group (Ng=1), while *ng2, ng4*, and *ng8* correspond to codebooks with Ng=2, 4, and 8 antenna port groups, respectively. |
| ***dataScramblingIdentityPUSCH***Identifier used to initialise data scrambling (c\_init) for PUSCH. If the field is absent, the UE applies the physical cell ID. (see TS 38.211 [16], clause 6.3.1.1). |
| ***dmrs-BundlingPUSCH-Config***Configure the parameters for DMRS bundling for PUSCH (see TS 38.214 [19], clause 6.1.7). In this release, this is not applicable to FR2-2. |
| ***dmrs-SequenceInitializationDCI-0-2***Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 0\_2. If the field is absent, then 0 bit for the field "DMRS Sequence Initialization" in DCI format 0\_2. If the field is present, then the number of bits is determined in the same way as DCI format 0\_1 (see TS 38.212 [17], clause 7.3.1).  |
| ***dmrs-UplinkForPUSCH-MappingTypeA, dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2***DMRS configuration for PUSCH transmissions using PUSCH mapping type A (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeA* applies to DCI formats 0\_1 and 0\_3, and the field *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-UplinkForPUSCH-MappingTypeB, dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2***DMRS configuration for PUSCH transmissions using PUSCH mapping type B (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeB* applies to DCI formats 0\_1 and 0\_3, and the field *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dynamicTransformPrecoderFieldPresenceDCI-0-1***Configure the presence of "Dynamic Transform Precoder" field in DCI format 0\_1. When the field is configured, then the "Dynamic Transform Precoder" field is present in DCI format 0\_1. Otherwise, the field size is set to 0 for DCI format 0\_1 (See TS 38.212 [17]). The network ensures *dynamicTransformPrecoderFieldPresenceDCI-0-1-r18* and *twoPHRMode-r17* cannot be configured at the same time for a UE. |
| ***dynamicTransformPrecoderFieldPresenceDCI-0-2***Configure the presence of "Dynamic Transform Precoder" field in DCI format 0\_2. When the field is configured, then the "Dynamic Transform Precoder" field is present in DCI format 0\_2. Otherwise, the field size is set to 0 for DCI format 0\_2 (See TS 38.212 [17]). The network ensures *dynamicTransformPrecoderFieldPresenceDCI-0-2-r18* and *twoPHRMode*-r17 cannot be configured at the same time for a UE. |
| ***frequencyHopping***The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3). The field *frequencyHopping* applies to DCI formats 0\_0, 0\_1 and 0\_3 for 'pusch-RepTypeA'. |
| ***frequencyHoppingDCI-0-1***Indicates the frequency hopping scheme for DCI format 0\_1 when *pusch-RepTypeIndicatorDCI-0-1* is set to 'pusch-RepTypeB', The value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for DCI format 0\_1 for 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1). |
| ***frequencyHoppingDCI-0-2***Indicate the frequency hopping scheme for DCI format 0\_2. The value *intraSlot* enables 'intra-slot frequency hopping', and the value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. When *pusch-RepTypeIndicatorDCI-0-2* is not set to '*pusch-RepTypeB*', the frequency hopping scheme can be chosen between 'intra-slot frequency hopping and 'inter-slot frequency hopping' if enabled. When *pusch-RepTypeIndicatorDCI-0-2* is set to '*pusch-RepTypeB*', the frequency hopping scheme can be chosen between 'inter-repetition frequency hopping' and 'inter-slot frequency hopping' if enabled. If the field is absent, frequency hopping is not configured for DCI format 0\_2 (see TS 38.214 [19], clause 6.3). |
| ***frequencyHoppingOffsetLists, frequencyHoppingOffsetListsDCI-0-2***Set of frequency hopping offsets used when frequency hopping is enabled for granted transmission (not msg3) and type 2 configured grant activation (see TS 38.214 [19], clause 6.3). The field *frequencyHoppingOffsetLists* applies to DCI formats 0\_0, 0\_1 and 0\_3, and the field *frequencyHoppingOffsetListsDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.3). |
| ***harq-ProcessNumberSizeDCI-0-2***Configure the number of bits for the field "HARQ process number" in DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***invalidSymbolPattern***Indicates one pattern for invalid symbols for PUSCH transmission repetition type B applicable to both DCI format 0\_1 and 0\_2. If *InvalidSymbolPattern* is not configured, semi-static flexible symbols are used for PUSCH. Segmentation occurs only around semi-static DL symbols (see TS 38.214 [19] clause 6.1). |
| ***invalidSymbolPatternIndicatorDCI-0-1, invalidSymbolPatternIndicatorDCI-0-2***Indicates the presence of an additional bit in the DCI format 0\_1/0\_2. If *invalidSymbolPattern* is absent, then both *invalidSymbolPatternIndicatorDCI-0-1* and *invalidSymbolPatternIndicatorDCI-0-2* are absent. The field *invalidSymbolPatternIndicatorDCI-0-1* applies to the DCI format 0\_1 and the field *invalidSymbolPatternIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19] clause 6.1). If the field is absent, the UE behaviour is specified in TS 38.214 [19], clause 6.1.2.1. |
| ***mappingPattern***Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern for when two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook' for PUSCH transmission and the PUSCH transmission occasions are associated with both SRS resource sets. |
| ***maxRank, maxRankDCI-0-2***Subset of PMIs addressed by TRIs from 1 to ULmaxRank (see TS 38.214 [19], clause 6.1.1.1). The field *maxRank* applies to DCI formats 0\_1 and 0\_3, and the field *maxRankDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.1.1). If network configures *maxRank-v1810* UE ignores *maxRank* (without suffix). |
| ***mcs-Table, mcs-TableFormat0-2***Indicates which MCS table the UE shall use for PUSCH without transform precoder (see TS 38.214 [19], clause 6.1.4.1). If the field is absent the UE applies the value 64QAM. The field *mcs-Table* applies to DCI formats 0\_0, 0\_1 and 0\_3, and the field *mcs-TableDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.4.1). |
| ***mcs-TableTransformPrecoder, mcs-TableTransformPrecoderDCI-0-2***Indicates which MCS table the UE shall use for PUSCH with transform precoding (see TS 38.214 [19], clause 6.1.4.1) If the field is absent the UE applies the value 64QAM. The field *mcs-TableTransformPrecoder* applies to DCI format 0\_0, 0\_1 and 0\_3, and the field *mcs-TableTransformPrecoderDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.4.1). |
| ***minimumSchedulingOffsetK2***List of minimum K2 values. Minimum K2 parameter denotes minimum applicable value(s) for the *Time domain resource assignment* table for PUSCH (see TS 38.214 [19], clause 6.1.2.1). |
| ***mpe-ResourcePoolToAddModList***List of SSB/CSI-RS resources for P-MPR reporting. Each resource is configured with serving cell index where the resource is configured for the UE. The *additionalPCI* is configured only if the resource is SSB. For each resource, if neither *cell* nor *additionalPCI* is present, the SSB/CSI-RS resource is from the serving cell where the *PUSCH-Config* is configured. |
| ***multipanelSchemeSDM***Configures UE with a multiple panel simultaneous uplink transmission SDM scheme for PUSCH, as specified in TS 38.214 [19], clause 6.1. Network does not configure *multipanelSchemeSDM* with *multipanelSchemeSFN*. When this parameter is configured, two SRS resource sets with *usage* for *codebook* or *noncodebook* are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2*. |
| ***multipanelSchemeSFN***Configures UE with a multiple panel simultaneous uplink transmission SFN scheme for PUSCH, as specified in TS 38.214 [19], clause 6.1. Network does not configure *multipanelSchemeSFN* with *multipanelSchemeSDM*. When this parameter is configured, two SRS resource sets with *usage* for *codebook* or *noncodebook* are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2*. |
| ***numberOfBitsForRV-DCI-0-2***Configures the number of bits for "Redundancy version" in the DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1). |
| ***numberOfInvalidSymbolsForDL-UL-Switching***Indicates the number of symbols after the last semi-static DL symbol that are invalid symbols for PUSCH repetition Type B. If it is absent, no symbol is explicitly defined for DL-to-UL switching (see TS 38.214 [19], clause 6.1). |
| ***priorityIndicatorDCI-0-1, priorityIndicatorDCI-0-2***Configures the presence of "priority indicator" in DCI format 0\_1/0\_2. When the field is absent in the IE, then the UE shall apply 0 bit for "Priority indicator" in DCI format 0\_1/0\_2. The field *priorityIndicatorDCI-0-1* applies to DCI format 0\_1 and the field *priorityIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13] clause 9). |
| ***pusch-AggregationFactor***Number of repetitions for data (see TS 38.214 [19], clause 6.1.2.1). If the field is absent the UE applies the value 1. |
| ***pusch-PowerControl***Configures power control parameters PUSCH transmission. This field is not configured if *unifiedTCI-StateType* is configured for the serving cell. |
| ***pusch-RepTypeIndicatorDCI-0-1, pusch-RepTypeIndicatorDCI-0-2***Indicates whether UE follows the behavior for "PUSCH repetition type A" or the behavior for "PUSCH repetition type B" for the PUSCH scheduled by DCI format 0\_1/0\_2 and for Type 2 CG associated with the activating DCI format 0\_1/0\_2.The value *pusch-RepTypeA* enables the 'PUSCH repetition type A' and the value *pusch-RepTypeB* enables the 'PUSCH repetition type B'. The field *pusch-RepTypeIndicatorDCI-0-1* applies to DCI format 0\_1 and the field *pusch-RepTypeIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***pusch-TimeDomainAllocationList***List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1). The field *pusch-TimeDomainAllocationList* applies to DCI format 0\_0, or DCI formats 0\_1 and 0\_3 when the field *pusch-TimeDomainAllocationListDCI-0-1* is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and tables 6.1.2.1.1-1A and 6.1.2.1.1-1C). The network does not configure the *pusch-TimeDomainAllocationList* (without suffix) simultaneously with the *pusch-TimeDomainAllocationListDCI-0-2-r16* or *pusch-TimeDomainAllocationListDCI-0-1-r16* or *pusch-TimeDomainAllocationListForMultiPUSCH-r16*. |
| ***pusch-TimeDomainAllocationListDCI-0-1***Configuration of the time domain resource allocation (TDRA) table for DCI formats 0\_1 and 0\_3 (see TS 38.214 [19], clause 6.1, tables 6.1.2.1.1-1A and 6.1.2.1.1-1C). |
| ***pusch-TimeDomainAllocationListDCI-0-2***Configuration of the time domain resource allocation (TDRA) table for DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2, table 6.1.2.1.1-1B). |
| ***pusch-TimeDomainAllocationListForMultiPUSCH***Configuration of the time domain resource allocation (TDRA) table for multiple PUSCH (see TS 38.214 [19], clause 6.1.2). The network configures at most 64 rows in this TDRA table in *PUSCH-TimeDomainResourceAllocationList-r16* configured by this field. This field is not configured simultaneously with *pusch-AggregationFactor*. The network does not configure the *pusch-TimeDomainAllocationListForMultiPUSCH-r16* simultaneously with the *pusch-TimeDomainAllocationListDCI-0-1-r16*. The network does not configure the *pusch-TimeDomainAllocationListForMultiPUSCH-r16* simultaneously with the *numberOfSlotsTBoMS-r17*. |
| ***rbg-Size***Selection between configuration 1 and configuration 2 for RBG size for PUSCH except PUSCH scheduled by DCI format 0\_3. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1). |
| ***resourceAllocation, resourceAllocationDCI-0-2***Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 6.1.2). The field *resourceAllocation* applies to DCI format 0\_1 and the field *resourceAllocationDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2). |
| ***resourceAllocationType1GranularityDCI-0-2***Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0\_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2). |
| ***secondTPCFieldDCI-0-1, secondTPCFieldDCI-0-2***A second TPC field can be configured via RRC for DCI-0-1 and DCI-0-2. Each TPC field is for each closed-loop index value respectively (i.e., 1st /2nd TPC fields correspond to "closedLoopIndex" value = 0 and 1, |
| ***sequenceOffsetForRV***Configures the RV offset for the starting RV for the first repetition (first actual repetition in PUSCH repetition Type B) towards the second 'SRS resource set' for PUSCH configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook'. |
| ***sTx-2Panel***Parameter to enable PUSCH+PUSCH multiple panel simultaneous uplink transmission, as specified in TS 38.214 [19], clause 6.1. |
| ***tp-pi2BPSK***Enables pi/2-BPSK modulation with transform precoding if the field is present and disables it otherwise.  |
| ***transformPrecoder***The UE specific selection of transformer precoder for PUSCH (see TS 38.214 [19], clause 6.1.3). When the field is absent the UE applies the value of the field *msg3-transformPrecoder* from *rach-ConfigCommon* included directly within BWP configuration (i.e., not included in *additionalRACH-ConfigList*). |
| ***txConfig***Whether UE uses codebook based or non-codebook based transmission (see TS 38.214 [19], clause 6.1.1). If the field is absent, the UE transmits PUSCH on one antenna port, see TS 38.214 [19], clause 6.1.1. |
| ***uci-OnPUSCH-ListDCI-0-1, uci-OnPUSCH-ListDCI-0-2***Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0\_1/0\_2. The field uci-OnPUSCH-ListDCI-0-1 applies to DCI format 0\_1 and the field uci-OnPUSCH-ListDCI-0-2 applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3). |
| ***ul-AccessConfigListDCI-0-1, ul-AccessConfigListDCI-0-2***List of the combinations of cyclic prefix extension, channel access priority class (CAPC), and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable for DCI format 0\_1 and DCI format 0\_2, respectively.The fields *ul-AccessConfigListDCI-0-1-r16* and *ul-AccessConfigListDCI-0-2-r17* are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.1.2-35). The field *ul-AccessConfigListDCI-0-1-r17* only contains a list of UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.1.2-35A). |
| ***ul-FullPowerTransmission***Configures the UE with UL full power transmission mode as specified in TS 38.213 [13]. This field is not configured if *ul-powerControl* is configured in the *BWP-UplinkDedicated* in which the *PUCCH-Config* is included. |

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| *PUSCH-ConfigDCI-0-3* field descriptions |
| ***harq-ProcessNumberSizeDCI-0-3***Configure the number of bits for the field "HARQ process number" in DCI format 0\_3 (see TS 38.212 [17], clause 7.3.1). |
| ***numberOfBitsForRV-DCI-0-3***Configures the number of bits for "Redundancy version" in the DCI format 0\_3 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1). |
| ***rbg-SizeDCI-0-3***Selection among configuration 1, configuration 2 and configuration 3 for RBG size for PUSCH scheduled by DCI format 0\_3. The UE does not apply this field if resourceAllocationDCI-0-3 is set to resourceAllocationType1. Otherwise, the UE applies the value config1 when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1). |
| ***resourceAllocationDCI-0-3***Configuration of resource allocation type 0 and resource allocation type 1 for DCI format 0\_3 (see TS 38.214 [19], clause 6.1.2). |
| ***resourceAllocationType1GranularityDCI-0-3***Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0\_3. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2). |
| ***uci-OnPUSCH-ListDCI-0-3***Selection between and configuration of dynamic and semi-static beta-offset for DCI format 0\_3. |

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| *SDM-Scheme* field descriptions |
| ***maxRankSDM,*** ***maxRankSDM-DCI-0-2***configure maximal number of MIMO layers of each panel in SDM scheme for codebook based PUSCH or for DCI 0\_2 for codebook based PUSCH. |

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| *SFN-Scheme* field descriptions |
| ***maxRankSFN,*** ***maxRankSFN-DCI-0-2***configure maximal number of MIMO layers of each panel in SFN scheme for codebook based PUSCH or for DCI 0\_2 for codebook based PUSCH. |

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| *UCI-OnPUSCH* field descriptions |
| ***betaOffsets***Selection between and configuration of dynamic and semi-static beta-offset for DCI formats other than DCI format 0\_2. If the field is not configured, the UE applies the value 'semiStatic' (see TS 38.213 [13], clause 9.3). |
| ***scaling***Indicates a scaling factor to limit the number of resource elements assigned to UCI on PUSCH for DCI formats other than DCI format 0\_2. Value *f0p5* corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on. The value configured herein is applicable for PUSCH with configured grant (see TS 38.212 [17], clause 6.3). |

|  |
| --- |
| *UCI-OnPUSCH-DCI-0-2* field descriptions |
| ***betaOffsetsDCI-0-2***Configuration of beta-offset for DCI format 0\_2. If semiStaticDCI-0-2 is chosen, the UE shall apply the value of 0 bit for the field of beta offset indicator in DCI format 0\_2. If dynamicDCI-0-2 is chosen, the UE shall apply the value of 1 bit or 2 bits for the field of beta offset indicator in DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3). |
| ***dynamicDCI-0-2***Indicates the UE applies the value 'dynamic' for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.3). |
| ***semiStaticDCI-0-2***Indicates the UE applies the value 'semiStatic' for DCI format 0\_2. (see TS 38.212 [17], clause 7.3.1 and see TS 38.213 [13], clause 9.3). |
| ***scalingDCI-0-2***Indicates a scaling factor to limit the number of resource elements assigned to UCI on PUSCH for DCI format 0\_2. Value f0p5 corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on (see TS 38.212 [17], clause 6.3). |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *codebookBased* | The field is mandatory present if *txConfig* is set to codebook and absent otherwise. |
| *RepTypeB* | The field is optionally present, Need S, if *pusch-RepTypeIndicatorDCI-0-1* is set to pusch-RepTypeB. It is absent otherwise. |
| *RepTypeB2* | The field is optionally present, Need S, if *pusch-RepTypeIndicatorDCI-0-1* or *pusch-RepTypeIndicatorDCI-0-2* is set to pusch-RepTypeB. It is absent otherwise. |
| *SRSsets* | This field is mandatory present when UE is configured with two SRS sets in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage codebook or non-codebook and none of *multipanelSchemeSDM* or *multipanelSchemeSFN* or *sTx-2Panel* is configured. It is absent otherwise. |

#### – *ServingCellConfig*

The IE *ServingCellConfig* is used to configure (add or modify) the UE with a serving cell, which may be the SpCell or an SCell of an MCG or SCG. The parameters herein are mostly UE specific but partly also cell specific (e.g. in additionally configured bandwidth parts). Reconfiguration between a PUCCH and PUCCHless SCell is only supported using an SCell release and add.

*ServingCellConfig* information element

-- ASN1START

-- TAG-SERVINGCELLCONFIG-START

ServingCellConfig ::= SEQUENCE {

 tdd-UL-DL-ConfigurationDedicated TDD-UL-DL-ConfigDedicated OPTIONAL, -- Cond TDD

 initialDownlinkBWP BWP-DownlinkDedicated OPTIONAL, -- Need M

 downlinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

 downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink OPTIONAL, -- Need N

 firstActiveDownlinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

 bwp-InactivityTimer ENUMERATED {ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30,

 ms40,ms50, ms60, ms80,ms100, ms200,ms300, ms500,

 ms750, ms1280, ms1920, ms2560, spare10, spare9, spare8,

 spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL, --Need R

 defaultDownlinkBWP-Id BWP-Id OPTIONAL, -- Need S

 uplinkConfig UplinkConfig OPTIONAL, -- Need M

 supplementaryUplink UplinkConfig OPTIONAL, -- Need M

 pdcch-ServingCellConfig SetupRelease { PDCCH-ServingCellConfig } OPTIONAL, -- Need M

 pdsch-ServingCellConfig SetupRelease { PDSCH-ServingCellConfig } OPTIONAL, -- Need M

 csi-MeasConfig SetupRelease { CSI-MeasConfig } OPTIONAL, -- Need M

 sCellDeactivationTimer ENUMERATED {ms20, ms40, ms80, ms160, ms200, ms240,

 ms320, ms400, ms480, ms520, ms640, ms720,

 ms840, ms1280, spare2,spare1} OPTIONAL, -- Cond ServingCellWithoutPUCCH

 crossCarrierSchedulingConfig CrossCarrierSchedulingConfig OPTIONAL, -- Need M

 tag-Id TAG-Id,

 dummy1 ENUMERATED {enabled} OPTIONAL, -- Need R

 pathlossReferenceLinking ENUMERATED {spCell, sCell} OPTIONAL, -- Cond SCellOnly

 servingCellMO MeasObjectId OPTIONAL, -- Cond MeasObject

 ...,

 [[

 lte-CRS-ToMatchAround SetupRelease { RateMatchPatternLTE-CRS } OPTIONAL, -- Need M

 rateMatchPatternToAddModList SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern OPTIONAL, -- Need N

 rateMatchPatternToReleaseList SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId OPTIONAL, -- Need N

 downlinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

 ]],

 [[

 supplementaryUplinkRelease-r16 ENUMERATED {true} OPTIONAL, -- Need N

 tdd-UL-DL-ConfigurationDedicated-IAB-MT-r16 TDD-UL-DL-ConfigDedicated-IAB-MT-r16 OPTIONAL, -- Cond TDD\_IAB

 dormantBWP-Config-r16 SetupRelease { DormantBWP-Config-r16 } OPTIONAL, -- Need M

 ca-SlotOffset-r16 CHOICE {

 refSCS15kHz INTEGER (-2..2),

 refSCS30KHz INTEGER (-5..5),

 refSCS60KHz INTEGER (-10..10),

 refSCS120KHz INTEGER (-20..20)

 } OPTIONAL, -- Cond AsyncCA

 dummy2 SetupRelease { DummyJ } OPTIONAL, -- Need M

 intraCellGuardBandsDL-List-r16 SEQUENCE (SIZE (1..maxSCSs)) OF IntraCellGuardBandsPerSCS-r16 OPTIONAL, -- Need S

 intraCellGuardBandsUL-List-r16 SEQUENCE (SIZE (1..maxSCSs)) OF IntraCellGuardBandsPerSCS-r16 OPTIONAL, -- Need S

 csi-RS-ValidationWithDCI-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 lte-CRS-PatternList1-r16 SetupRelease { LTE-CRS-PatternList-r16 } OPTIONAL, -- Need M

 lte-CRS-PatternList2-r16 SetupRelease { LTE-CRS-PatternList-r16 } OPTIONAL, -- Need M

 crs-RateMatch-PerCORESETPoolIndex-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 enableTwoDefaultTCI-States-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 enableDefaultTCI-StatePerCoresetPoolIndex-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 enableBeamSwitchTiming-r16 ENUMERATED {true} OPTIONAL, -- Need R

 cbg-TxDiffTBsProcessingType1-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 cbg-TxDiffTBsProcessingType2-r16 ENUMERATED {enabled} OPTIONAL -- Need R

 ]],

 [[

 directionalCollisionHandling-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 channelAccessConfig-r16 SetupRelease { ChannelAccessConfig-r16 } OPTIONAL -- Need M

 ]],

 [[

 nr-dl-PRS-PDC-Info-r17 SetupRelease {NR-DL-PRS-PDC-Info-r17} OPTIONAL, -- Need M

 semiStaticChannelAccessConfigUE-r17 SetupRelease {SemiStaticChannelAccessConfigUE-r17} OPTIONAL, -- Need M

 mimoParam-r17 SetupRelease {MIMOParam-r17} OPTIONAL, -- Need M

 channelAccessMode2-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 timeDomainHARQ-BundlingType1-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 nrofHARQ-BundlingGroups-r17 ENUMERATED {n1, n2, n4} OPTIONAL, -- Need R

 fdmed-ReceptionMulticast-r17 ENUMERATED {true} OPTIONAL, -- Need R

 moreThanOneNackOnlyMode-r17 ENUMERATED {mode2} OPTIONAL, -- Need S

 tci-ActivatedConfig-r17 TCI-ActivatedConfig-r17 OPTIONAL, -- Cond TCI\_ActivatedConfig

 directionalCollisionHandling-DC-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 lte-NeighCellsCRS-AssistInfoList-r17 SetupRelease { LTE-NeighCellsCRS-AssistInfoList-r17 } OPTIONAL -- Need M

 ]],

 [[

 lte-NeighCellsCRS-Assumptions-r17 ENUMERATED {false} OPTIONAL -- Need R

 ]],

 [[

 crossCarrierSchedulingConfigRelease-r17 ENUMERATED {true} OPTIONAL -- Need N

 ]],

 [[

 multiPDSCH-PerSlotType1-CB-r17 ENUMERATED {enabled, disabled} OPTIONAL -- Need R

 ]],

 [[

 lte-CRS-PatternList3-r18 SetupRelease { LTE-CRS-PatternList-r16 } OPTIONAL, -- Need M

 lte-CRS-PatternList4-r18 SetupRelease { LTE-CRS-PatternList-r16 } OPTIONAL, -- Need M

 pdcch-CandidateReceptionWith-CRS-Overlap-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 cjt-Scheme-PDSCH-r18 ENUMERATED {cjtSchemeA, cjtSchemeB} OPTIONAL, -- Need R

 tag2-r18 Tag2-r18 OPTIONAL, -- Need R

 cellDTX-DRX-Config-r18 SetupRelease { CellDTX-DRX-Config-r18 } OPTIONAL, -- Need M

 positionInDCI-cellDTRX-r18 INTEGER (0..maxDCI-2-9-Size-1-r18) OPTIONAL, -- Need R

 cellDTX-DRX-L1activation-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 mc-DCI-SetOfCellsToAddModList-r18 SEQUENCE (SIZE (1..maxNrofSetsOfCells-r18)) OF MC-DCI-SetOfCells-r18 OPTIONAL, -- Need N

 mc-DCI-SetOfCellsToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofSetsOfCells-r18)) OF SetOfCellsId-r18 OPTIONAL -- Need N

 ]]

}

Tag2-r18 ::= SEQUENCE {

 tag2-Id-r18 TAG-Id,

 tag2-flag-r18 BOOLEAN,

 n-TimingAdvanceOffset2-r18 ENUMERATED { n0, n25600, n39936, spare1 } OPTIONAL -- Need S

}

UplinkConfig ::= SEQUENCE {

 initialUplinkBWP BWP-UplinkDedicated OPTIONAL, -- Need M

 uplinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

 uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink OPTIONAL, -- Need N

 firstActiveUplinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

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

 carrierSwitching SetupRelease { SRS-CarrierSwitching } OPTIONAL, -- Need M

 ...,

 [[

 powerBoostPi2BPSK BOOLEAN OPTIONAL, -- Need M

 uplinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

 ]],

 [[

 enablePL-RS-UpdateForPUSCH-SRS-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 enableDefaultBeamPL-ForPUSCH0-0-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 enableDefaultBeamPL-ForPUCCH-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 enableDefaultBeamPL-ForSRS-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 uplinkTxSwitching-r16 SetupRelease { UplinkTxSwitching-r16 } OPTIONAL, -- Need M

 mpr-PowerBoost-FR2-r16 ENUMERATED {true} OPTIONAL -- Need R

 ]],

 [[

 srs-PosTx-Hopping-r18 SetupRelease { SRS-PosTx-Hopping-r18 } OPTIONAL, -- Need M

 enablePL-RS-UpdateForType1CG-PUSCH-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 powerBoostPi2BPSK-r18 BOOLEAN OPTIONAL, -- Need R

 powerBoostQPSK-r18 BOOLEAN OPTIONAL -- Need R

 ]]

}

DummyJ ::= SEQUENCE {

 maxEnergyDetectionThreshold-r16 INTEGER(-85..-52),

 energyDetectionThresholdOffset-r16 INTEGER (-20..-13),

 ul-toDL-COT-SharingED-Threshold-r16 INTEGER (-85..-52) OPTIONAL, -- Need R

 absenceOfAnyOtherTechnology-r16 ENUMERATED {true} OPTIONAL -- Need R

}

ChannelAccessConfig-r16 ::= SEQUENCE {

 energyDetectionConfig-r16 CHOICE {

 maxEnergyDetectionThreshold-r16 INTEGER (-85..-52),

 energyDetectionThresholdOffset-r16 INTEGER (-13..20)

 } OPTIONAL, -- Need R

 ul-toDL-COT-SharingED-Threshold-r16 INTEGER (-85..-52) OPTIONAL, -- Need R

 absenceOfAnyOtherTechnology-r16 ENUMERATED {true} OPTIONAL -- Need R

}

IntraCellGuardBandsPerSCS-r16 ::= SEQUENCE {

 guardBandSCS-r16 SubcarrierSpacing,

 intraCellGuardBands-r16 SEQUENCE (SIZE (1..4)) OF GuardBand-r16

}

GuardBand-r16 ::= SEQUENCE {

 startCRB-r16 INTEGER (0..274),

 nrofCRBs-r16 INTEGER (0..15)

}

DormancyGroupID-r16 ::= INTEGER (0..4)

DormantBWP-Config-r16::= SEQUENCE {

 dormantBWP-Id-r16 BWP-Id OPTIONAL, -- Need M

 withinActiveTimeConfig-r16 SetupRelease { WithinActiveTimeConfig-r16 } OPTIONAL, -- Need M

 outsideActiveTimeConfig-r16 SetupRelease { OutsideActiveTimeConfig-r16 } OPTIONAL -- Need M

}

WithinActiveTimeConfig-r16 ::= SEQUENCE {

 firstWithinActiveTimeBWP-Id-r16 BWP-Id OPTIONAL, -- Need M

 dormancyGroupWithinActiveTime-r16 DormancyGroupID-r16 OPTIONAL -- Need R

}

OutsideActiveTimeConfig-r16 ::= SEQUENCE {

 firstOutsideActiveTimeBWP-Id-r16 BWP-Id OPTIONAL, -- Need M

 dormancyGroupOutsideActiveTime-r16 DormancyGroupID-r16 OPTIONAL -- Need R

}

UplinkTxSwitching-r16 ::= SEQUENCE {

 uplinkTxSwitchingPeriodLocation-r16 BOOLEAN,

 uplinkTxSwitchingCarrier-r16 ENUMERATED {carrier1, carrier2}

}

MIMOParam-r17 ::= SEQUENCE {

 additionalPCI-ToAddModList-r17 SEQUENCE (SIZE(1..maxNrofAdditionalPCI-r17)) OF SSB-MTC-AdditionalPCI-r17 OPTIONAL, -- Need N

 additionalPCI-ToReleaseList-r17 SEQUENCE (SIZE(1..maxNrofAdditionalPCI-r17)) OF AdditionalPCIIndex-r17 OPTIONAL, -- Need N

 unifiedTCI-StateType-r17 ENUMERATED {separate, joint} OPTIONAL, -- Need R

 uplink-PowerControlToAddModList-r17 SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF Uplink-powerControl-r17 OPTIONAL, -- Need N

 uplink-PowerControlToReleaseList-r17 SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF Uplink-powerControlId-r17 OPTIONAL, -- Need N

 sfnSchemePDCCH-r17 ENUMERATED {sfnSchemeA,sfnSchemeB} OPTIONAL, -- Need R

 sfnSchemePDSCH-r17 ENUMERATED {sfnSchemeA,sfnSchemeB} OPTIONAL -- Need R

}

MC-DCI-SetOfCells-r18 ::= SEQUENCE {

 setOfCellsId-r18 SetOfCellsId-r18,

 nCI-Value-r18 INTEGER (0..7),

 scheduledCellListDCI-1-3-r18 SEQUENCE (SIZE (2..maxNrofCellsInSet-r18)) OF ServCellIndex OPTIONAL, -- Need R

 scheduledCellListDCI-0-3-r18 SEQUENCE (SIZE (2..maxNrofCellsInSet-r18)) OF ServCellIndex OPTIONAL, -- Need R

 scheduledCellComboListDCI-1-3-r18 SEQUENCE (SIZE (1..maxNrofCellCombos-r18)) OF ScheduledCellCombo-r18 OPTIONAL, -- Need R

 scheduledCellComboListDCI-0-3-r18 SEQUENCE (SIZE (1..maxNrofCellCombos-r18)) OF ScheduledCellCombo-r18 OPTIONAL, -- Need R

 antennaPortsDCI1-3-r18 ENUMERATED {type1a, type2} OPTIONAL, -- Cond TypeDCI1-3

 antennaPortsDCI0-3-r18 ENUMERATED {type1a, type2} OPTIONAL, -- Cond TypeDCI0-3

 tpmi-DCI0-3-r18 ENUMERATED {type1a, type2} OPTIONAL, -- Cond TypeDCI0-3

 sri-DCI0-3-r18 ENUMERATED {type1a, type2} OPTIONAL, -- Cond TypeDCI0-3

 priorityIndicatorDCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 priorityIndicatorDCI-0-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 dormancyDCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 dormancyDCI-0-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdcchMonAdaptDCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdcchMonAdaptDCI-0-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 minimumSchedulingOffsetK0DCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 minimumSchedulingOffsetK0DCI-0-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdsch-HARQ-ACK-OneShotFeedbackDCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdsch-HARQ-ACK-enhType3DCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdsch-HARQ-ACK-enhType3DCIfieldDCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdsch-HARQ-ACK-retxDCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 pucch-sSCellDynDCI-1-3-r18 ENUMERATED {enabled} OPTIONAL, -- Need R

 tdra-FieldIndexListDCI-1-3-r18 SEQUENCE (SIZE (1..32)) OF TDRA-FieldIndexDCI-1-3-r18 OPTIONAL, -- Need R

 tdra-FieldIndexListDCI-0-3-r18 SEQUENCE (SIZE (1..64)) OF TDRA-FieldIndexDCI-0-3-r18 OPTIONAL, -- Need R

 rateMatchListDCI-1-3-r18 SEQUENCE (SIZE (1..16)) OF RateMatchDCI-1-3-r18 OPTIONAL, -- Need R

 zp-CSI-RSListDCI-1-3-r18 SEQUENCE (SIZE (1..8)) OF ZP-CSI-DCI-1-3-r18 OPTIONAL, -- Need R

 tci-ListDCI-1-3-r18 SEQUENCE (SIZE (1..16)) OF TCI-DCI-1-3-r18 OPTIONAL, -- Need R

 srs-RequestListDCI-1-3-r18 SEQUENCE (SIZE (1..16)) OF SRS-RequestCombo-r18 OPTIONAL, -- Need R

 srs-OffsetListDCI-1-3-r18 SEQUENCE (SIZE (1..8)) OF SRS-OffsetCombo-r18 OPTIONAL, -- Need R

 srs-RequestListDCI-0-3-r18 SEQUENCE (SIZE (1..16)) OF SRS-RequestCombo-r18 OPTIONAL, -- Need R

 srs-OffsetListDCI-0-3-r18 SEQUENCE (SIZE (1..8)) OF SRS-OffsetCombo-r18 OPTIONAL -- Need R

}

SetOfCellsId-r18 ::= INTEGER (0..maxNrofSetsOfCells-1-r18)

ScheduledCellCombo-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsInSet-r18)) OF INTEGER (0..maxNrofCellsInSet-1-r18)

RateMatchDCI-1-3-r18 ::= SEQUENCE (SIZE (1..maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (1..2))

ZP-CSI-DCI-1-3-r18 ::= SEQUENCE (SIZE (1.. maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (1..2))

TCI-DCI-1-3-r18 ::= SEQUENCE (SIZE (2.. maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (3))

SRS-RequestCombo-r18 ::= SEQUENCE (SIZE (1.. maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (2..3))

SRS-OffsetCombo-r18 ::= SEQUENCE (SIZE (1.. maxNrofCellsInSet-r18)) OF INTEGER (0..3)

TDRA-FieldIndexDCI-1-3-r18 ::= SEQUENCE (SIZE (2.. maxNrofBWPsInSetOfCells-r18)) OF INTEGER (0..maxNrofDL-Allocations-1-r18)

TDRA-FieldIndexDCI-0-3-r18 ::= SEQUENCE (SIZE (2.. maxNrofBWPsInSetOfCells-r18)) OF INTEGER (0..maxNrofUL-Allocations-1-r18)

-- TAG-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *ChannelAccessConfig* field descriptions |
| ***absenceOfAnyOtherTechnology***Presence of this field indicates absence on a long term basis (e.g. by level of regulation) of any other technology sharing the carrier; absence of this field indicates the potential presence of any other technology sharing the carrier, as specified in TS 37.213 [48] clauses 4.2.1 and 4.2.3. |
| ***energyDetectionConfig***Indicates whether to use the *maxEnergyDetectionThreshold* or the *energyDetectionThresholdOffset* (see TS 37.213 [48], clause 4.2.3)*.* |
| ***energyDetectionThresholdOffset***Indicates the offset to the default maximum energy detection threshold value. Unit in dB. Value -13 corresponds to -13dB, value -12 corresponds to -12dB, and so on (i.e. in steps of 1dB) as specified in TS 37.213 [48], clause 4.2.3. |
| ***maxEnergyDetectionThreshold***Indicates the absolute maximum energy detection threshold value. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm) as specified in TS 37.213 [48], clause 4.2.3. |
| ***ul-toDL-COT-SharingED-Threshold***Maximum energy detection threshold that the UE should use to share channel occupancy with gNB for DL transmission as specified in TS 37.213 [48], clause 4.1.3 for downlink channel access and clause 4.2.3 for uplink channel access. This field is not applicable in semi-static channel access mode. |

|  |
| --- |
| *ServingCellConfig* field descriptions |
| ***additionalPCI-ToAddModList***List of information for the additional SSB with different PCI than the serving cell PCI. The additional SSBs with different PCIs are not used for serving cell quality derivation. |
| ***bwp-InactivityTimer***The duration in ms after which the UE falls back to the default Bandwidth Part (see TS 38.321 [3], clause 5.15). When the network releases the timer configuration, the UE stops the timer without switching to the default BWP. |
| ***ca-SlotOffset***Slot offset between the primary cell (PCell/PSCell) and the SCell in unaligned frame boundary with slot alignment and partial SFN alignment inter-band CA. Based on this field, the UE determines the time offset of the SCell as specified in clause 4.5 of TS 38.211 [16]. The granularity of this field is determined by the reference SCS for the slot offset (i.e. the maximum of PCell/PSCell lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB* and this serving cell's lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*).The Network configures at most single non-zero offset duration in ms (independent on SCS) among CCs in the unaligned CA configuration. If the field is absent, the UE applies the value of 0. The slot offset value can only be changed with SCell release and add. |
| ***cbg-TxDiffTBsProcessingType1, cbg-TxDiffTBsProcessingType2***Indicates whether processing types 1 and 2 based CBG based operation is enabled according to Rel-16 UE capabilities. |
| ***cellDTX-DRX-Config***Used to configure cell DTX/DRX for the serving cell, as specified in TS 38.321 [3]. A maximum of two cell DTX/DRX patterns can be configured per MAC entity for different serving cells. The two configured patterns are aligned, that the start and slot offset are common and the periodicity of one pattern is an integer multiple of the other. Cell DTX is configured only when connected mode DRX is configured. |
| ***cellDTX-DRX-L1activation***Indicates whether this serving cell has enabled L1 signaling based on DCI 2\_9 for dynamic activation/deactivation of cell DTX/DRX configuration. |
| ***cjt-Scheme-PDSCH***This field is used to configure CJT Tx scheme *cjtSchemeA* or *cjtSchemeB* for PDSCH reception, see TS 38.214 [19] clause 5.1.5. |
| ***channelAccessConfig***List of parameters used for access procedures of operation with shared spectrum channel access (see TS 37.213 [48). |
| ***channelAccessMode2***If present, this field indicates that the UE shall apply channel access procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE does not apply these channel access procedures. The network always configures this field if channel access procedures are required for the serving cell within this region by regulations.Overwrites the corresponding field in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB* for this serving cell. |
| ***crossCarrierSchedulingConfig***Indicates whether this serving cell is cross-carrier scheduled by another serving cell or whether it cross-carrier schedules another serving cell. If the field *other* is configured for an SpCell (i.e., the SpCell is cross-carrier scheduled by another serving cell), the SpCell can be additionally scheduled by the PDCCH on the SpCell. |
| ***crossCarrierSchedulingConfigRelease***If this field is included, the UE shall release the cross carrier scheduling configuration configured by *crossCarrierSchedulingConfig*. The network may only include either *crossCarrierSchedulingConfigRelease* or *crossCarrierSchedulingConfig* at a time. |
| ***crs-RateMatch-PerCORESETPoolIndex***Indicates how UE performs rate matching when both lte-CRS-PatternList1-r16 and lte-CRS-PatternList2-r16 are configured or when both *lte-CRS-PatternList3-r18* and *lte-CRS-PatternList4-r18* are configured as specified in TS 38.214 [19], clause 5.1.4.2. |
| ***csi-RS-ValidationWithDCI***Indicates how the UE performs periodic and semi-persistent CSI-RS reception in a slot. The presence of this field indicates that the UE uses DCI detection to validate whether to receive CSI-RS (see TS 38.213 [13], clause 11.1). |
| ***defaultDownlinkBWP-Id***The initial bandwidth part is referred to by BWP-Id = 0. ID of the downlink bandwidth part to be used upon expiry of the BWP inactivity timer. This field is UE specific. When the field is absent the UE uses the initial BWP as default BWP. (see TS 38.213 [13], clause 12 and TS 38.321 [3], clause 5.15). |
| ***directionalCollisionHandling***Indicates that this serving cell is using directional collision handling between a reference and other cell(s) for half-duplex operation in TDD CA with same SCS as specified in TS 38.213 [13], clause 11.1. The half-duplex operation only applies within the same frequency range and cell group.The network only configures this field for TDD serving cells that are using the same SCS. |
| ***directionalCollisionHandling-DC***For the IAB-MT, it indicates that this serving cell is using directional collision handling between a reference and other cell(s) for half-duplex operation in TDD NR-DC with same SCS within same cell group or cross different cell groups. |
| ***dormantBWP-Config***The dormant BWP configuration for an SCell. This field can be configured only for a (non-PUCCH) SCell. |
| ***downlinkBWP-ToAddModList***List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12). |
| ***downlinkBWP-ToReleaseList***List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12). |
| ***downlinkChannelBW-PerSCS-List***A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *DownlinkConfigCommon* / *DownlinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15], TS 38.101-2 [39], and TS 38.101-5 [75]. If the UE is an (e)RedCap UE and needs to autonomously switch to its initial downlink bandwidth part to perform a random access procedure but its current UE specific channel bandwidth does not cover the initial downlink bandwidth part, the UE autonomously changes its UE specific channel bandwidth to cover the initial downlink bandwidth part. In that case, after completion of the random access procedure, the network ensures that the UE specific channel bandwidth fully covers the UE's active downlink bandwidth part in subsequent bandwidth part switch operations. |
| ***dummy1, dummy 2***This field is not used in the specification. If received it shall be ignored by the UE. |
| ***enableBeamSwitchTiming***Indicates the aperiodic CSI-RS triggering with beam switching triggering behaviour as defined in clause 5.2.1.5.1 of TS 38.214 [19]. |
| ***enableDefaultTCI-StatePerCoresetPoolIndex***Presence of this field indicates the UE shall follow the release 16 behavior of default TCI state per CORESETPoolindex when the UE is configured by higher layer parameter PDCCH-Config that contains two different values of CORESETPoolIndex in ControlResourceSet is enabled. |
| ***enableTwoDefaultTCI-States***Presence of this field indicates the UE shall follow the release 16 behavior of two default TCI states for PDSCH when at least one TCI codepoint is mapped to two TCI states is enabled |
| ***fdmed-ReceptionMulticast***Indicates the Type-1 HARQ codebook generation as specified in TS 38.213 [13], clause 9.1.2.1. |
| ***firstActiveDownlinkBWP-Id***If configured for an SpCell, this field contains the ID of the DL BWP to be activated or to be used for RLM, BFD and measurements if included in an *RRCReconfiguration* message contained in an NR or E-UTRA RRC message indicating that the SCG is deactivated, upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch. If the field is absent for the PSCell at SCG deactivation, the UE considers the previously activated DL BWP as the BWP to be used for RLM, BFD and measurements. If the field is absent for the PSCell at SCG activation, the DL BWP to be activated is the DL BWP previously to be used for RLM, BFD and measurements.If configured for an SCell, this field contains the ID of the downlink bandwidth part to be used upon activation of an SCell. The initial bandwidth part is referred to by BWP-Id = 0.Upon reconfiguration with *reconfigurationWithSync*, the network sets the *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* to the same value. |
| ***initialDownlinkBWP***The dedicated (UE-specific) configuration for the initial downlink bandwidth-part (i.e., DL BWP#0). If any of the optional IEs are configured within this IE, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***intraCellGuardBandsDL-List, intraCellGuardBandsUL-List***List of intra-cell guard bands in a serving cell for operation with shared spectrum channel access in FR1. If not configured, the guard bands are defined according to 38.101-1 [15], see TS 38.214 [19], clause 7. For operation in licensed spectrum, this field is absent, and no UE action is required. |
| ***lte-CRS-PatternList1***A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. The network does not configure this field and *lte-CRS-ToMatchAround* simultaneously. |
| ***lte-CRS-PatternList2***A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured with 1. This list is configured only if CORESETPoolIndex configured with 1. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in lte-CRS-PatternList1, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in lte-CRS-PatternList1, and so on. Network configures this field only if the field *lte-CRS-ToMatchAround* is not configured and there is at least one ControlResourceSet in one DL BWP of this serving cell with *coresetPoolIndex* set to 1. |
| ***lte-CRS-PatternList3***A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. The network does not configure this field and *lte-CRS-ToMatchAround,* or this field and *lte-CRS-PatternList1*, or this field and *lte-CRS-PatternList2* simultaneously. |
| ***lte-CRS-PatternList4***A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in *lte-CRS-PatternList3*. The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in *lte-CRS-PatternList3*, and so on. Network configures this field only if the field *lte-CRS-ToMatchAround* is not configured and the field *lte-CRS-PatternList3* is configured. |
| ***lte-CRS-ToMatchAround***Parameters to determine an LTE CRS pattern that the UE shall rate match around. |
| ***lte-NeighCellsCRS-AssistInfoList***A list of LTE neighbour cells configuration information which is used to assist the UE to perform CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR (see TS 38.101-4 [59]). If the field is included, it replaces any previous list, i.e. all the entries of the list are replaced and each of the *LTE-NeighCellsCRS-AssistInfo* entries is considered to be newly created and the conditions and Need codes for setup of the entry apply. |
| ***lte-NeighCellsCRS-Assumptions***If the field is not configured, the following default network configuration assumptions are valid for all LTE neighbour cells for the purpose of CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR (see TS 38.101-4 [59]).- The CRS port number is the same as the one indicated in *RateMatchPatternLTE-CRS* if configured for the serving cell.- The CRS port number is 4 if *RateMatchPatternLTE-CRS* is not configured for the serving cell.- The channel bandwidth and centre frequency are the same as the ones indicated in *RateMatchPatternLTE-CRS* if configured for the serving cell.- The MBSFN configuration is the same as the one indicated in *RateMatchPatternLTE-CRS* if configured for the serving cell. If *RateMatchPatternLTE-CRS* is not configured for the serving cell, MBSFN subframe is not configured.- Network-based CRS interference mitigation (i.e., CRS muting), as in *crs-IntfMitigConfig* specified in TS 36.331 [10], is not enabled.If the field is configured (i.e. false) and *LTE-NeighCellsCRS-AssistInfoList* is configured, the configuration provided in *LTE-NeighCellsCRS-AssistInfoList* overrides the default network configuration assumptions.If the field is configured (i.e. false) and *LTE-NeighCellsCRS-AssistInfoList* is not configured, it is up to the UE implementation whether to apply CRS-IM operation. |
| ***mc-DCI-SetOfCellsToAddModList***List of up to N (N<=4) configurations of set(s) of cells for multi-cell PDSCH/PUSCH scheduling from the serving cell, where N is reported as UE capability and up to 4 sets of cells can be configured per PUCCH group. When this field is configured to a SCell, PCell cannot be included in either ScheduledCellListDCI-1-3 or ScheduledCellListDCI-0-3. |
| ***multiPDSCH-PerSlotType1-CB***Configures the UE behaviour for Type1 codebook HARQ ACK generation regarding the number of PDSCHs per slot on a serving cell as specified in TS 38.213 [13], clause 9.1.2.1.When this parameter is configured and set to *disabled* for a serving cell, the network does not schedule UE with more than one PDSCH in a slot on the serving cell if HARQ-ACKs of any two PDSCHs in the slot on the serving cell are supposed to be reported on one PUCCH resource in the same PUCCH slot. If two *coresetPoolIndex* values are configured, the number of received PDSCHs is per *coresetPoolIndex* value per slot for a serving cell. If the UE generates two HARQ-ACK codebooks for two priorities, the number of received PDSCHs is per priority per slot for a serving cell. If *fdmed-ReceptionMulticast* is configured, the number of received PDSCHs is per traffic type (unicast / multicast) per slot for a serving cell. |
| ***nr-dl-PRS-PDC-Info***Configures the DL PRS for propagation delay compensation. When configured, the UE measures the UE Rx-Tx time difference based on the reference signals configured in this field. |
| ***nrofHARQ-BundlingGroups***Indicates the number of HARQ bundling groups for type2 HARQ-ACK codebook. |
| ***pathlossReferenceLinking***Indicates whether UE shall apply as pathloss reference either the downlink of SpCell (PCell for MCG or PSCell for SCG) or of SCell that corresponds with this uplink (see TS 38.213 [13], clause 7). |
| ***pdcch-CandidateReceptionWith-CRS-Overlap***Presence of this field indicates the UE shall monitor PDCCH candidates that overlap with LTE CRS RE(s). |
| ***pdsch-ServingCellConfig***PDSCH related parameters that are not BWP-specific. |
| ***positionInDCI-cellDTRX***The starting bit position of an information block of DCI format 2\_9 for this serving cell (see TS 38.212 [17], clause 7.3.1.3.10). |
| ***rateMatchPatternToAddModList***Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology. See TS 38.214 [19], clause 5.1.4.1. If a *RateMatchPattern* with the same *RateMatchPatternId* is configured in both *ServingCellConfig/ServingCellConfigCommon* and in SIB20/MCCH, the entire *RateMatchPattern* configuration shall be the same, including the set of RBs/REs indicated by the patterns for the rate matching around, and they are counted as a single rate match pattern in the total configured rate match patterns as defined in TS 38.214 [19]. |
| ***sCellDeactivationTimer***SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity. |
| ***sfnSchemePDCCH***This parameter is used to configure single frequency network scheme for PDCCH: sfnSchemeA or sfnSchemeB as specified (see TS 38.214 [19], clause 5.1). If network includes both *sfnSchemePDCCH* and *sfnSchemePDSCH*, same value shall be configured. |
| ***sfnSchemePDSCH***This parameter is used to configure single frequency network scheme for PDSCH: sfnSchemeA or sfnSchemeB as specified (see TS 38.214 [19], clause 5.1). If network includes both *sfnSchemePDCCH* and *sfnSchemePDSCH*, same value shall be configured. The network does not configure this parameter and *repetitionSchemeConfig* in *PDSCH-Config* simultaneously in the same serving cell. |
| ***semiStaticChannelAccessConfigUE***When this field is configured and when *channelAccessMode-r16* (see IE ServingCellConfigCommon and IE ServingCellConfigCommonSIB) is configured to *semiStatic*, the UE operates in semi-static channel access mode and can initiate a channel occupancy periodically (see TS 37.213 [48], Clause 4.3).The period can be configured independently from period configured in *SemiStaticChannelAccessConfig-r16* if the UE indicates the corresponding capability. Otherwise, the periodicity configured by *periodUE-r17* is an integer multiple of or an integer factor of the periodicity indicated by *period* in *SemiStaticChannelAccessConfig-r16.* |
| ***servingCellMO****measObjectId* of the *MeasObjectNR* in *MeasConfig* which is associated to the serving cell. For this *MeasObjectNR*, the following relationship applies between this MeasObjectNR and *frequencyInfoDL* in *ServingCellConfigCommon/ServingCellConfigCommonSIB* of the serving cell: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* and if *csi-rs-ResourceConfigMobility* is configured, the value of its *subcarrierSpacing* is present in one entry of the *scs-SpecificCarrierList*, *csi-RS-CellListMobility* includes an entry corresponding to the serving cell (with *cellId* equal to *physCellId* in *ServingCellConfigCommon*) and the frequency range indicated by the *csi-rs-MeasurementBW* of the entry in *csi-RS-CellListMobility* is included in the frequency range indicated by in the entry of the *scs-SpecificCarrierList*. |
| ***supplementaryUplink***Network may configure this field only when *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon* or *supplementaryUplink* is configured in *ServingCellConfigCommonSIB*. |
| ***supplementaryUplinkRelease***If this field is included, the UE shall release the uplink configuration configured by *supplementaryUplink*. The network only includes either *supplementaryUplinkRelease* or *supplementaryUplink* at a time. |
| ***tag-Id***Timing Advance Group ID, as specified in TS 38.321 [3], which this cell or set of TCI-States of this cell are associated with. |
| ***tag2***This field to indicate the second TAG information for the serving cell, it is optionally configured in a serving cell if and only if the serving cell is configured with more than one value for the *coresetPoolIndex*. |
| ***tci-ActivatedConfig***If configured for an SCell, or if configured for the PSCell when the SCG is being activated upon the reception of the containing message, the UE shall consider the TCI states provided in this field as the activated TCI states for PDCCH/PDSCH reception on this serving cell.If configured for the PSCell when the SCG is indicated as deactivated in the containing message:- the UE shall consider the TCI states provided in this field as the TCI states to be activated for PDCCH/PDSCH reception upon a later SCG activation in which *tci-ActivatedConfig* is absent- if bfd-and-RLM is configured and no RS is configured in *RadioLinkMonitoringConfig* for RLM, respectively for BFD, the UE shall use the TCI states provided in this field for PDCCH as RS for RLM, respectively for BFD.When this field is absent for the PSCell and the SCG is being deactivated:- the UE shall consider the previously activated TCI states as the TCI states to be activated for PDCCH/PDSCH reception upon a later SCG activation in which *tci-ActivatedConfig* is absent- if *bfd-and-RLM* is configured and no RS is configured in *RadioLinkMonitoringConfig* for RLM, respectively for BFD, the UE shall use the previously activated TCI states for PDCCH as RS for RLM, respectively for BFD. |
| ***tdd-UL-DL-ConfigurationDedicated-IAB-MT***Resource configuration per IAB-MT D/U/F overrides all symbols (with a limitation that effectively only flexible symbols can be overwritten in Rel-16) per slot over the number of slots as provided by *TDD-UL-DL ConfigurationCommon*. |
| ***unifiedTCI-StateType***Indicates the unified TCI state type the UE is configured for this serving cell. The value *separate* means this serving cell is configured with *dl-OrJointTCI-StateList* for DL TCI state and *ul-TCI-ToAddModList* for UL TCI state. The value *joint* means this serving cell is configured with *dl-OrJointTCI-StateList* for joint TCI state for UL and DL operation. |
| ***uplinkConfig***Network may configure this field only when *uplinkConfigCommon* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. Addition or release of this field can only be done upon SCell addition or release (respectively). |
| ***uplink-PowerControlToAddModList***Configures UL power control parameters for PUSCH, PUCCH and SRS when field unifiedTCI-StateType is configured for this serving cell. |

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| *Tag2 field descriptions* |
| ***n-TimingAdvanceOffset2***The *N\_TA-Offset2* to be applied for PDCCH order CFRA towards the active *additionalPCI* as specified in TS 38.133 [14] clause 7.1.2 and for all uplink transmissions on this serving cell associated to *tag2* as specified in TS 38.213 [13] clause 4.2. This field is always present if *SSB-MTC-AdditionalPCI* is configured. It is absent otherwise. If absent, the *N\_TA-Offset* is applied for all uplink transmissions on this serving cell associated to *tag2*. |
| ***tag2-flag***If this field is set to true, the *tag2-Id* is associated to value 0 and *tag-Id* is associated to value 1 of field TI bit in RAR, fallbackRAR and in the absolute TAC MAC CE, see TS 38.321 [3]. Otherwise, the *tag2-Id* is associated to value 1 and *tag-Id* is associated to value 0 of field TI bit in RAR, fallbackRAR and in the absolute TAC MAC CE, see TS 38.321 [3]. |
| ***tag2-Id***Timing Advance Group ID, as specified in TS 38.321 [3], which this cell or set of TCI-States of this cell are associated with. |

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| *UplinkConfig* field descriptions |
| ***carrierSwitching***Includes parameters for configuration of carrier based SRS switching (see TS 38.214 [19], clause 6.2.1.3. |
| ***enableDefaultBeamPL-ForPUSCH0-0, enableDefaultBeamPL-ForPUCCH, enableDefaultBeamPL-ForSRS***When the parameter is present, UE derives the spatial relation and the corresponding pathloss reference Rs as specified in 38.213, clauses 7.1.1, 7.2.1, 7.3.1 and 9.2.2. The network only configures these parameters for FR2. |
| ***enablePL-RS-UpdateForPUSCH-SRS***When this parameter is present, the Rel-16 feature of MAC CE based pathloss RS updates for PUSCH/SRS is enabled. Network only configures this parameter when the UE is configured with *sri-PUSCH-PowerControl*. If this field is not configured, network configures at most 4 pathloss RS resources for PUSCH/PUCCH/SRS transmissions per BWP, not including pathloss RS resources for SRS transmissions for positioning. (See TS 38.213 [13], clause 7). |
| ***enablePL-RS-UpdateForType1CG-PUSCH***When this parameter is present, the Rel-18 feature of MAC CE based pathloss RS updates for Type 1 CG-PUSCH is enabled. The network only configures this parameter, when the parameter *enablePL-RS-UpdateForPUSCH-SRS* is configured. (See TS 38.213 [13], clause 7). |
| ***firstActiveUplinkBWP-Id***If configured for an SpCell, this field contains the ID of the UL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.If configured for an SCell, this field contains the ID of the uplink bandwidth part to be used upon activation of an SCell. The initial bandwidth part is referred to by BandiwdthPartId = 0. |
| ***initialUplinkBWP***The dedicated (UE-specific) configuration for the initial uplink bandwidth-part (i.e. UL BWP#0). If any of the optional IEs are configured within this IE as part of the IE *uplinkConfig*, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***moreThanOneNackOnlyMode***Indicates the mode of NACK-only feedback in the PUCCH transmission, as specified in TS 38.213 [13], clause 18. If multicast CFR is not configured, this field is not included. Otherwise, if the field is absent, UE uses mode 1 for multicast CFR. |
| ***mpr-PowerBoost-FR2***Indicates whether UE is allowed to boost uplink transmission power by suspending in-band emission (IBE) requirements as specified in TS 38.101-2 [39]. Network only configures this field for FR2 serving cells. |
| ***powerBoostPi2BPSK***If this field is set to *true*, the UE determines the maximum output power for PUCCH/PUSCH transmissions that use pi/2 BPSK modulation according to TS 38.101-1 [15], clause 6.2.4. The network ensures that *powerBoostPi2BPSK* and *powerBoostPi2BPSK-r18* are not configured at the same time for a UE. |
| ***powerBoostQPSK***If this field is set to *true*, the UE determines the maximum output power for PUSCH transmissions that use QPSK modulation according to TS 38.101-1 [15], clause 6.2.4. |
| ***pusch-ServingCellConfig***PUSCH related parameters that are not BWP-specific. |
| ***srs-PosTx-Hopping***Contains configuration related to the SRS for Positioning with frequency hopping for RRC\_CONNETCED state. |
| ***uplinkBWP-ToAddModList***The additional bandwidth parts for uplink to be added or modified. In case of TDD uplink- and downlink BWP with the same *bandwidthPartId* are considered as a BWP pair and must have the same center frequency. |
| ***uplinkBWP-ToReleaseList***The additional bandwidth parts for uplink to be released. |
| ***uplinkChannelBW-PerSCS-List***A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *UplinkConfigCommon* / *UplinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15], TS 38.101-2 [39], and TS 38.101-5 [75]. If the UE is an (e)RedCap UE and needs to autonomously switch to its initial uplink bandwidth part to perform a random access procedure but its current UE specific channel bandwidth does not cover the initial uplink bandwidth part, the UE autonomously changes its UE specific channel bandwidth to cover the initial uplink bandwidth part. In that case, after completion of the random access procedure, the network ensures that the UE specific channel bandwidth fully covers the UE's active uplink bandwidth part in subsequent bandwidth part switch operations. |
| ***uplinkTxSwitchingPeriodLocation***Indicates whether the location of UL Tx switching period is configured in this uplink carrier in case of inter-band UL CA, SUL, or (NG)EN-DC, as specified in TS 38.101-1 [15] and TS 38.101-3 [34].In case of (NG)EN-DC, network always configures this field to TRUE for NR carrier (i.e. with (NG)EN-DC, the UL switching period always occurs on the NR carrier).In case of inter-band UL CA or SUL, for dynamic uplink Tx switching between 2 bands with 2 uplink carriers or 3 uplink carriers as defined in TS 38.101-1 [15], network configures this field to TRUE for the uplink carrier(s) on one band and configures this field to FALSE for the uplink carrier(s) on the other band. This field is set to the same value for the carriers on the same band. |
| ***uplinkTxSwitchingCarrier***Indicates that the configured carrier is carrier1 or carrier2 for dynamic uplink Tx switching, as defined in TS 38.101-1 [15] and TS 38.101-3 [34]. In case of (NG)EN-DC, network always configures the NR carrier as carrier 2.In case of inter-band UL CA or SUL, for dynamic uplink Tx switching between 2 bands with 2 uplink carriers or 3 uplink carriers as defined in TS 38.101-1 [15], network configures the uplink carrier(s) on one band as carrier1 and the uplink carrier(s) on the other band as carrier2. This field is set to the same value for the carriers on the same band. |

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| *DormantBWP-Config* field descriptions |
| ***dormancyGroupWithinActiveTime***This field contains the ID of an SCell group for Dormancy within active time, to which this SCell belongs. The use of the Dormancy within active time for SCell groups is specified in TS 38.213 [13]. |
| ***dormancyGroupOutsideActiveTime***This field contains the ID of an SCell group for Dormancy outside active time, to which this SCell belongs. The use of the Dormancy outside active time for SCell groups is specified in TS 38.213 [13]. |
| ***dormantBWP-Id***This field contains the ID of the downlink bandwidth part to be used as dormant BWP. If this field is configured, its value is different from *defaultDownlinkBWP-Id*, and at least one of the *withinActiveTimeConfig* and *outsideActiveTimeConfig* should be configured. |
| ***firstOutsideActiveTimeBWP-Id***This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy outside active time. |
| ***firstWithinActiveTimeBWP-Id***This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy within active time. |
| ***outsideActiveTimeConfig***This field contains the configuration to be used for SCell dormancy outside active time, as specified in TS 38.213 [13]. The field can only be configured when the cell group the SCell belongs to is configured with *dcp-Config*. |
| ***withinActiveTimeConfig***This field contains the configuration to be used for SCell dormancy within active time, as specified in TS 38.213 [13].  |

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| *GuardBand* field descriptions |
| ***startCRB***Indicates the starting RB of the guard band. |
| ***nrofCRB***Indicates the length of the guard band in RBs. When set to 0, zero-size guard band is used. |

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| *MC-DCI-SetOfCells* field descriptions |
| ***antennaPortsDCI1-3, antennaPortsDCI0-3***Configure the indication type for antenna port(s) field in DCI format 1\_3 and DCI format 0\_3, respectively (see TS 38.212, clauses 7.3.1.2.4 and 7.3.1.1.4). |
| ***dormancyDCI-1-3, dormancyDCI-0-3***Configure the presence of Scell dormancy indication field in DCI format 1\_3 and DCI format 0\_3, respectively. |
| ***minimumSchedulingOffsetK0DCI-1-3, minimumSchedulingOffsetK0DCI-0-3***Configure the presence of minimum applicable scheduling offset indicator field in DCI format 1\_3 and DCI format 0\_3, respectively. |
| ***nCI-Value***Configure n\_CI value used for the set of cells, where unique n\_CI value is configured for each set of cells. |
| ***pdcchMonAdaptDCI-1-3, pdcchMonAdaptDCI-0-3***Configure the presence of PDCCH monitoring adaptation indication field in DCI format 1\_3 and DCI format 0\_3, respectively. |
| ***pdsch-HARQ-ACK-enhType3DCI-1-3***Enable the enhanced Type 3 HARQ-ACK codebook triggering using DCI format 1\_3. |
| ***pdsch-HARQ-ACK-enhType3DCIfieldDCI-1-3***Enables the enhanced Type 3 CB through a new DCI field to indicate the enhanced Type 3 HARQ-ACK codebook in DCI format 1\_3 if the more than one enhanced Type HARQ-ACK codebook is configured for the primary PUCCH cell group. |
| ***pdsch-HARQ-ACK-OneShotFeedbackDCI-1-3***When configured, the DCI\_format 1\_3 can request the UE to report A/N for all HARQ processes and all CCs configured in the PUCCH group. |
| ***pdsch-HARQ-ACK-retxDCI-1-3***When configured, the DCI format 1\_3 can request the UE to perform a HARQ-ACK re-transmission on a PUCCH resource (see TS 38.213 [13], clause 9.1.5). |
| ***priorityIndicatorDCI-1-3, priorityIndicatorDCI-0-3***Configure the presence of priority indicator field in DCI format 1\_3 and DCI format 0\_3, respectively (see TS 38.212 [17], clauses 7.3.1.2.4 and 7.3.1.1.4 and TS 38.213 [13] clause 9). |
| ***pucch-sSCellDynDCI-1-3***Configure the UE with PUCCH cell switching based on dynamic indication in DCI format 1\_3 (see TS 38.213 [13], clause 9.A). |
| ***RateMatchDCI-1-3***Configure each row of the joint rate matching indication table for DL scheduling via DCI format 1\_3, where bitmap for a cell points to a corresponding rate matching indication applicable for DCI format 1-1 (i.e., MSB and LSB of bitmap refer *rateMatchPatternGroup1* and *rateMatchPatternGroup2* for a cell, respectively), the order of rate matching indication bitmap in each row refers the order of cells in *ScheduledCellListDCI-1-3*, that are configured with *rateMatchPatternGroup1* or *rateMatchPatternGroup2* on at least one DL BWP (i.e., first bitmap is for the first cell in *ScheduledCellListDCI-1-X*, that are configured with *rateMatchPatternGroup1* or *rateMatchPatternGroup2* on at least one DL BWP and so on), the number of entries in a row of *rateMatchDCI-1-3* should be the same as the number of cells, that are configured with *rateMatchPatternGroup1* or *rateMatchPatternGroup2* on at least one DL BWP, included in *ScheduledCellListDCI-1-3*, and entries for co-scheduled cells in a row of *rateMatchDCI-1-3* are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1\_3. |
| ***rateMatchListDCI-1-3***Configure joint rate matching indication table for DL scheduling via DCI format 1\_3. |
| ***ScheduledCellCombo***Configure each row of the table for combinations of co-scheduled cells for DL scheduling via DCI format 1\_3 and for UL scheduling via DCI format 0\_3, where index with value INTEGER (0...3) of co-scheduled cell refers to *scheduledCellListDCI-1-3* for DL and *scheduledCellListDCI-0-3* for UL. |
| ***scheduledCellComboListDCI-1-3, scheduledCellComboListDCI-0-3***Configure the table for combinations of co-scheduled cells for DL scheduling via DCI format 1\_3 and DCI format 0\_3, respectively. |
| ***scheduledCellListDCI-1-3, scheduledCellListDCI-0-3***Configure the list of possible co-scheduled cells in the set for DL scheduling via DCI format 1\_3 and DCI format 0\_3 respectively, where the serving cells in the list are in ascending order of serving cell indices and are mapped to index {0, 1, 2, 3} in the set. Total number of cells within the same set of cells i.e., in *scheduledCellListDCI-1-3* and *scheduledCellListDCI-0-3*, is up to 4.When a cell is included in either or both of *scheduledCellListDCI-1-3* or *scheduledCellListDCI-0-3* for one set of cells *MC-DCI-SetofCells*, the cell cannot be included in any of *scheduledCellListDCI-1-3* or *scheduledCellListDCI-0-3* for any other set of cells. |
| ***setOfCellsId***Configure index of the set of cells to be indicated in DCI format 0\_3/1\_3. |
| ***sri-DCI0-3***Configure the indication type for SRS resource indicator field in DCI format 0\_3 (See TS 38.212, clause 7.3.1.1.4). |
| ***SRS-OffsetCombo***Configure each row of the joint SRS offset indicator table for DL scheduling via DCI format 1\_3 and for UL scheduling via DCI format 0\_3, where index for a cell points to a corresponding SRS offset indicator applicable for DCI format 1-1 and 0-1, and the order of SRS offset indicator index in each row refers the order of cells in *scheduledCell-ListDCI-1-3* (i.e., first index is for the first cell in *scheduledCellListDCI-1-3*, that are configured with more than one entry in *availableSlotOffsetList* for at least one aperiodic SRS resource set on at least one UL BWP and so on) for DL and *scheduledCellListDCI-0-3* for UL, included in *scheduledCellListDCI-1-3* for *srs-OffsetListDCI-1-3* and *scheduledCellListDCI-0-3* for *srs-OffsetListDCI-0-3*, and entries for co-scheduled cells in a row of *SRS-OffsetCombo* are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1\_3/0\_3. |
| ***srs-OffsetListDCI-1-3, srs-OffsetListDCI-0-3***Configure joint SRS offset indicator table for DL scheduling via DCI format 1\_3 and DCI format 0\_3, respectively. |
| ***SRS-RequestCombo***Configure each row of the joint SRS request table for DL scheduling via DCI format 1\_3 and for UL scheduling via DCI format 0\_3, where index for a cell points to a corresponding SRS request applicable for DCI format 1-1 and 0-1, and the order of SRS request index in each row refers the order of cells in *scheduledCellListDCI-1-3* (i.e., first index is for the first cell in *scheduledCellListDCI-1-3* and so on) for DL and *scheduledCellListDCI-0-3* for UL. The number of entries in a row of *SRS-RequestCombo* should be the same as the number of cells included in *scheduledCellListDCI-1-3* for *srs-RequestListDCI-1-3* and *scheduledCellListDCI-0-3* for *srs-RequestListDCI-0-3*, and entries for co-scheduled cells in a row of *SRS-RequestCombo* are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1\_3/0\_3. |
| ***srs-RequestListDCI-1-3, srs-RequestListDCI-0-3***Configure joint SRS request table for DL scheduling via DCI format 1\_3 and DCI format 0\_3, respectively. |
| ***TCI-DCI-1-3***Configure each row of the joint TCI table for DL scheduling via DCI format 1\_3, where index for a cell points to a corresponding TCI applicable for DCI format 1-1, and the order of TCI index in each row refers the order of cells in *scheduledCellListDCI-1-3* (i.e., first index is for the first cell in *scheduledCellListDCI-1-3* that configured with *tci-StatesToAddModList* and so on), the number of entries in a row of *TCI-DCI-1-3* should be the same as the number of cells that configured with *tci-StatesToAddModList* on at least one DL BWP, included in *scheduledCellListDCI-1-3*, and entries for co-scheduled cells in a row of *TCI-DCI-1-3* are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1\_3. |
| ***tci-ListDCI-1-3***Configure joint TCI table for DL scheduling via DCI format 1\_3 |
| ***TDRA-FieldIndexDC-0-3***Configure each row of the joint TDRA field table for UL scheduling via DCI format 0\_3 containing the applicable TDRA field indexes for multiple BWPs/cells, where the TDRA index for a BWP of a cell points to a corresponding TDRA in the TDRA table applicable for DCI format 0-1, the order of TDRA index in each row refers the *BWP-Id* for a cell and the order of cells in *scheduledCellListDCI-0-3* (i.e., first TDRA index in a row is for the smallest BWP-Id that can be scheduled by the DCI format 0-3, as specified in 38.212, of the first cell in *scheduledCellListDCI-0-3*, second TDRA index in a row is for the second smallest BWP-Id 1 that can be scheduled by the DCI format 0-3, as specified in 38.212, of the first cell and so on), and the number of TDRA indices in a row of *TDRA-FieldIndexDCI-0-3* should be the same as the total number of BWPs that can be scheduled by the DCI format 0-3, as specified in 38.212, across cells included in *scheduledCellListDCI-0-3*. |
| ***TDRA-FieldIndexDCI-1-3***Configure each row of the joint TDRA field table for DL scheduling via DCI format 1\_3 containing the applicable TDRA field indexes for multiple BWPs/cells, where the TDRA index for a BWP of a cell points to a corresponding TDRA in the TDRA table applicable for DCI format 1-1, the order of TDRA index in each row refers the BWP-Id for a cell and the order of cells in *scheduledCellListDCI-1-3* (i.e., first TDRA index in a row is for the smallest BWP-Id that can be scheduled by the DCI format 1-3, as specified in 38.212, of the first cell in *scheduledCellListDCI-1-3*, second TDRA index in a row is for the second smallest BWP-Id that can be scheduled by the DCI format 1-3, as specified in 38.212, of the first cell and so on ), and the number of TDRA indices in a row of *TDRA-FieldIndexDCI-1-3* should be the same as the total number of BWPs that can be scheduled by the DCI format 1-3, as specified in 38.212, across cells included in *scheduledCellListDCI-1-3*. |
| ***tdra-FieldIndexListDCI-1-3, tdra-FieldIndexListDCI-0-3***Configure joint TDRA table for UL scheduling via DCI format 1\_3 and DCI format 0\_3, respectively. |
| ***tpmi-DCI0-3***Configure the indication type for precoding information and number of layers field in DCI format 0\_3 (See TS 38.212, clause 7.3.1.1.4). |
| ***ZP-CSI-DCI-1-3***Configure each row of the joint ZP-CSI-RS trigger table for DL scheduling via DCI format 1\_3, where index for a cell points to a corresponding ZP-CSI-RS trigger applicable for DCI format 1-1, and the order of ZP-CSI-RS trigger index in each row refers the order of cells in *scheduledCellListDCI-1-3* (i.e., first index is for the first cell in *scheduledCellListDCI-1-3*, that are configured with aperiodic-*ZP-CSI-RS-ResourceSetsToAddModList* on at least one DL BWP and so on), the number of entries in a row of *ZP-CSI-DCI-1-3* should be the same as the number of cells, that are configured with *aperiodic-ZP-CSI-RS-ResourceSetsToAddModList* on at least one DL BWP, included in *scheduledCellListDCI-1-3*, and entries for co-scheduled cells in a row of *ZP-CSI-DCI-1-3* are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1\_3. |
| ***zp-CSI-RSListDCI-1-3***Configure joint ZP-CSI-RS trigger table for DL scheduling via DCI format 1\_3. |

NOTE 1: If the dedicated part of initial UL/DL BWP configuration is absent, the initial BWP can be used but with some limitations. For example, changing to another BWP requires *RRCReconfiguration* since DCI format 1\_0 doesn't support DCI-based switching.

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *AsyncCA* | This field is mandatory present for SCells whose slot offset between the SpCell is not 0. Otherwise it is absent, Need S. |
| *MeasObject* | This field is mandatory present for the SpCell if the UE has a *measConfig*, and it is optionally present, Need M, for SCells. For (e)RedCap UEs, this field is optionally present, Need M. |
| *SCellOnly* | This field is optionally present, Need R, for SCells. It is absent otherwise.  |
| *ServingCellWithoutPUCCH* | This field is optionally present, Need S, for SCells except PUCCH SCells. It is absent otherwise. |
| *SyncAndCellAdd* | This field is mandatory present for a SpCell upon reconfiguration with *reconfigurationWithSync* and upon *RRCSetup*/*RRCResume*.The field is optionally present for an SpCell, Need N, upon reconfiguration without *reconfigurationWithSync*.The field is mandatory present for an SCell upon addition, and absent for SCell in other cases, Need M. |
| *TCI\_ActivatedConfig* | This field is optional Need N for SCells if *sCellState* is configured, otherwise it is absent.This field is optional Need S for the PSCell when the SCG is indicated as deactivated or is being activated, otherwise it is absent.This field is absent for the PCell. |
| *TDD* | This field is optionally present, Need R, for TDD cells. It is absent otherwise. |
| *TDD\_IAB* | For IAB-MT, this field is optionally present, Need R, for TDD cells. It is absent otherwise. |
| *TypeDCI0-3* | This field is mandatory present if *ScheduledCellListDCI-0-3* is configured, otherwise it is absent, Need R. |
| *TypeDCI1-3* | This field is mandatory present if *ScheduledCellListDCI-1-3* is configured, otherwise it is absent, Need R. |

#### – *SRS-Config*

The IE *SRS-Config* is used to configure sounding reference signal transmissions. The configuration defines a list of SRS-Resources, a list of SRS-PosResources, a list of SRS-PosResourceSets and a list of SRS-ResourceSets. Each resource set defines a set of SRS-Resources or SRS-PosResources. The network triggers the transmission of the set of SRS-Resources or SRS-PosResources using a configured aperiodicSRS-ResourceTrigger (L1 DCI). The network does not configure SRS specific power control parameters *alpha* (without suffix) or *pathlossReferenceRS* if *unifiedTCI-StateType* is configured for the serving cell.

*SRS-Config* information element

-- ASN1START

-- TAG-SRS-CONFIG-START

SRS-Config ::= SEQUENCE {

 srs-ResourceSetToReleaseList SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId OPTIONAL, -- Need N

 srs-ResourceSetToAddModList SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet OPTIONAL, -- Need N

 srs-ResourceToReleaseList SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-ResourceId OPTIONAL, -- Need N

 srs-ResourceToAddModList SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-Resource OPTIONAL, -- Need N

 tpc-Accumulation ENUMERATED {disabled} OPTIONAL, -- Need S

 ...,

 [[

 srs-RequestDCI-1-2-r16 INTEGER (1..2) OPTIONAL, -- Need S

 srs-RequestDCI-0-2-r16 INTEGER (1..2) OPTIONAL, -- Need S

 srs-ResourceSetToAddModListDCI-0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet OPTIONAL, -- Need N

 srs-ResourceSetToReleaseListDCI-0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId OPTIONAL, -- Need N

 srs-PosResourceSetToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSetId-r16

 OPTIONAL, -- Need N

 srs-PosResourceSetToAddModList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSet-r16 OPTIONAL,-- Need N

 srs-PosResourceToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16 OPTIONAL,-- Need N

 srs-PosResourceToAddModList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResource-r16 OPTIONAL -- Need N

 ]],

 [[

 dci-TriggeringPosResourceSetLink-r18 ENUMERATED { enabled } OPTIONAL -- Need R

 ]]

}

SRS-ResourceSet ::= SEQUENCE {

 srs-ResourceSetId SRS-ResourceSetId,

 srs-ResourceIdList SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-ResourceId OPTIONAL, -- Cond Setup

 resourceType CHOICE {

 aperiodic SEQUENCE {

 aperiodicSRS-ResourceTrigger INTEGER (1..maxNrofSRS-TriggerStates-1),

 csi-RS NZP-CSI-RS-ResourceId OPTIONAL, -- Cond NonCodebook

 slotOffset INTEGER (1..32) OPTIONAL, -- Need S

 ...,

 [[

 aperiodicSRS-ResourceTriggerList SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-2))

 OF INTEGER (1..maxNrofSRS-TriggerStates-1) OPTIONAL -- Need M

 ]]

 },

 semi-persistent SEQUENCE {

 associatedCSI-RS NZP-CSI-RS-ResourceId OPTIONAL, -- Cond NonCodebook

 ...

 },

 periodic SEQUENCE {

 associatedCSI-RS NZP-CSI-RS-ResourceId OPTIONAL, -- Cond NonCodebook

 ...

 }

 },

 usage ENUMERATED {beamManagement, codebook, nonCodebook, antennaSwitching},

 alpha Alpha OPTIONAL, -- Need S

 p0 INTEGER (-202..24) OPTIONAL, -- Cond Setup

 pathlossReferenceRS PathlossReferenceRS-Config OPTIONAL, -- Need M

 srs-PowerControlAdjustmentStates ENUMERATED { sameAsFci2, separateClosedLoop} OPTIONAL, -- Need S

 ...,

 [[

 pathlossReferenceRSList-r16 SetupRelease { PathlossReferenceRSList-r16} OPTIONAL -- Need M

 ]],

 [[

 usagePDC-r17 ENUMERATED {true} OPTIONAL, -- Need R

 availableSlotOffsetList-r17 SEQUENCE (SIZE(1..4)) OF AvailableSlotOffset-r17 OPTIONAL, -- Need R

 followUnifiedTCI-StateSRS-r17 ENUMERATED {enabled} OPTIONAL -- Need R

 ]],

 [[

 applyIndicatedTCI-State-r18 ENUMERATED {first, second} OPTIONAL -- Cond FollowUTCI

 ]]

}

AvailableSlotOffset-r17 ::= INTEGER (0..7)

PathlossReferenceRS-Config ::= CHOICE {

 ssb-Index SSB-Index,

 csi-RS-Index NZP-CSI-RS-ResourceId

}

PathlossReferenceRSList-r16 ::= SEQUENCE (SIZE (1..maxNrofSRS-PathlossReferenceRS-r16)) OF PathlossReferenceRS-r16

PathlossReferenceRS-r16 ::= SEQUENCE {

 srs-PathlossReferenceRS-Id-r16 SRS-PathlossReferenceRS-Id-r16,

 pathlossReferenceRS-r16 PathlossReferenceRS-Config

}

SRS-PathlossReferenceRS-Id-r16 ::= INTEGER (0..maxNrofSRS-PathlossReferenceRS-1-r16)

SRS-PosResourceSet-r16 ::= SEQUENCE {

 srs-PosResourceSetId-r16 SRS-PosResourceSetId-r16,

 srs-PosResourceIdList-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-PosResourceId-r16

 OPTIONAL, -- Cond Setup

 resourceType-r16 CHOICE {

 aperiodic-r16 SEQUENCE {

 aperiodicSRS-ResourceTriggerList-r16 SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-1))

 OF INTEGER (1..maxNrofSRS-TriggerStates-1) OPTIONAL, -- Need M

 ...

 },

 semi-persistent-r16 SEQUENCE {

 ...

 },

 periodic-r16 SEQUENCE {

 ...

 }

 },

 alpha-r16 Alpha OPTIONAL, -- Need S

 p0-r16 INTEGER (-202..24) OPTIONAL, -- Cond Setup

 pathlossReferenceRS-Pos-r16 CHOICE {

 ssb-IndexServing-r16 SSB-Index,

 ssb-Ncell-r16 SSB-InfoNcell-r16,

 dl-PRS-r16 DL-PRS-Info-r16

 } OPTIONAL, -- Need M

 ...

}

SRS-ResourceSetId ::= INTEGER (0..maxNrofSRS-ResourceSets-1)

SRS-PosResourceSetId-r16 ::= INTEGER (0..maxNrofSRS-PosResourceSets-1-r16)

SRS-Resource ::= SEQUENCE {

 srs-ResourceId SRS-ResourceId,

 nrofSRS-Ports ENUMERATED {port1, ports2, ports4},

 ptrs-PortIndex ENUMERATED {n0, n1 } OPTIONAL, -- Need R

 transmissionComb CHOICE {

 n2 SEQUENCE {

 combOffset-n2 INTEGER (0..1),

 cyclicShift-n2 INTEGER (0..7)

 },

 n4 SEQUENCE {

 combOffset-n4 INTEGER (0..3),

 cyclicShift-n4 INTEGER (0..11)

 }

 },

 resourceMapping SEQUENCE {

 startPosition INTEGER (0..5),

 nrofSymbols ENUMERATED {n1, n2, n4},

 repetitionFactor ENUMERATED {n1, n2, n4}

 },

 freqDomainPosition INTEGER (0..67),

 freqDomainShift INTEGER (0..268),

 freqHopping SEQUENCE {

 c-SRS INTEGER (0..63),

 b-SRS INTEGER (0..3),

 b-hop INTEGER (0..3)

 },

 groupOrSequenceHopping ENUMERATED { neither, groupHopping, sequenceHopping },

 resourceType CHOICE {

 aperiodic SEQUENCE {

 ...

 },

 semi-persistent SEQUENCE {

 periodicityAndOffset-sp SRS-PeriodicityAndOffset,

 ...

 },

 periodic SEQUENCE {

 periodicityAndOffset-p SRS-PeriodicityAndOffset,

 ...

 }

 },

 sequenceId INTEGER (0..1023),

 spatialRelationInfo SRS-SpatialRelationInfo OPTIONAL, -- Need R

 ...,

 [[

 resourceMapping-r16 SEQUENCE {

 startPosition-r16 INTEGER (0..13),

 nrofSymbols-r16 ENUMERATED {n1, n2, n4},

 repetitionFactor-r16 ENUMERATED {n1, n2, n4}

 } OPTIONAL -- Need R

 ]],

 [[

 spatialRelationInfo-PDC-r17 SetupRelease { SpatialRelationInfo-PDC-r17 } OPTIONAL, -- Need M

 resourceMapping-r17 SEQUENCE {

 startPosition-r17 INTEGER (0..13),

 nrofSymbols-r17 ENUMERATED {n1, n2, n4, n8, n10, n12, n14},

 repetitionFactor-r17 ENUMERATED {n1, n2, n4, n5, n6, n7, n8, n10, n12, n14}

 } OPTIONAL, -- Need R

 partialFreqSounding-r17 SEQUENCE {

 startRBIndexFScaling-r17 CHOICE{

 startRBIndexAndFreqScalingFactor2-r17 INTEGER (0..1),

 startRBIndexAndFreqScalingFactor4-r17 INTEGER (0..3)

 },

 enableStartRBHopping-r17 ENUMERATED {enable} OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 transmissionComb-n8-r17 SEQUENCE {

 combOffset-n8-r17 INTEGER (0..7),

 cyclicShift-n8-r17 INTEGER (0..5)

 } OPTIONAL, -- Need R

 srs-TCI-State-r17 CHOICE {

 srs-UL-TCI-State TCI-UL-StateId-r17,

 srs-DLorJointTCI-State TCI-StateId

 } OPTIONAL -- Need R

 ]],

 [[

 repetitionFactor-v1730 ENUMERATED {n3} OPTIONAL, -- Need R

 srs-DLorJointTCI-State-v1730 SEQUENCE {

 cellAndBWP-r17 ServingCellAndBWP-Id-r17

 } OPTIONAL -- Cond DLorJointTCI-SRS

 ]],

 [[

 nrofSRS-Ports-n8-r18 ENUMERATED {ports8, ports8tdm} OPTIONAL, -- Need R

 combOffsetHopping-r18 SEQUENCE {

 hoppingId-r18 INTEGER (0..1023) OPTIONAL, -- Need R

 hoppingSubset-r18 CHOICE {

 transmissionComb-n4 BIT STRING (SIZE (4)),

 transmissionComb-n8 BIT STRING (SIZE (8))

 } OPTIONAL, -- Need R

 hoppingWithRepetition-r18 ENUMERATED {symbol, repetition} OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 cyclicShiftHopping-r18 SEQUENCE {

 hoppingId-r18 INTEGER (0..1023) OPTIONAL, -- Need R

 hoppingSubset-r18 CHOICE {

 transmissionComb-n2 BIT STRING (SIZE (8)),

 transmissionComb-n4 BIT STRING (SIZE (12)),

 transmissionComb-n8 BIT STRING (SIZE (6))

 } OPTIONAL, -- Need R

 hoppingFinerGranularity-r18 ENUMERATED {enable} OPTIONAL -- Need R

 } OPTIONAL -- Need R

 ]]

}

SRS-PosResource-r16::= SEQUENCE {

 srs-PosResourceId-r16 SRS-PosResourceId-r16,

 transmissionComb-r16 CHOICE {

 n2-r16 SEQUENCE {

 combOffset-n2-r16 INTEGER (0..1),

 cyclicShift-n2-r16 INTEGER (0..7)

 },

 n4-r16 SEQUENCE {

 combOffset-n4-r16 INTEGER (0..3),

 cyclicShift-n4-r16 INTEGER (0..11)

 },

 n8-r16 SEQUENCE {

 combOffset-n8-r16 INTEGER (0..7),

 cyclicShift-n8-r16 INTEGER (0..5)

 },

 ...

 },

 resourceMapping-r16 SEQUENCE {

 startPosition-r16 INTEGER (0..13),

 nrofSymbols-r16 ENUMERATED {n1, n2, n4, n8, n12}

 },

 freqDomainShift-r16 INTEGER (0..268),

 freqHopping-r16 SEQUENCE {

 c-SRS-r16 INTEGER (0..63),

 ...

 },

 groupOrSequenceHopping-r16 ENUMERATED { neither, groupHopping, sequenceHopping },

 resourceType-r16 CHOICE {

 aperiodic-r16 SEQUENCE {

 slotOffset-r16 INTEGER (1..32) OPTIONAL, -- Need S

 ...

 },

 semi-persistent-r16 SEQUENCE {

 periodicityAndOffset-sp-r16 SRS-PeriodicityAndOffset-r16,

 ...,

 [[

 periodicityAndOffset-sp-Ext-r16 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL -- Need R

 ]],

 [[

 srs-PosPeriodicConfigHyperSFN-Index-r18 ENUMERATED {even0, odd1} OPTIONAL --Need R

 ]]

 },

 periodic-r16 SEQUENCE {

 periodicityAndOffset-p-r16 SRS-PeriodicityAndOffset-r16,

 ...,

 [[

 periodicityAndOffset-p-Ext-r16 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL -- Need R

 ]],

 [[

 srs-PosPeriodicConfigHyperSFN-Index-r18 ENUMERATED {even0, odd1} OPTIONAL --Need R

 ]]

 }

 },

 sequenceId-r16 INTEGER (0..65535),

 spatialRelationInfoPos-r16 SRS-SpatialRelationInfoPos-r16 OPTIONAL, -- Need R

 ...,

 [[

 txHoppingConfig-r18 TxHoppingConfig-r18 OPTIONAL --Need R

 ]]

}

SRS-SpatialRelationInfo ::= SEQUENCE {

 servingCellId ServCellIndex OPTIONAL, -- Need S

 referenceSignal CHOICE {

 ssb-Index SSB-Index,

 csi-RS-Index NZP-CSI-RS-ResourceId,

 srs SEQUENCE {

 resourceId SRS-ResourceId,

 uplinkBWP BWP-Id

 }

 }

}

SRS-SpatialRelationInfoPos-r16 ::= CHOICE {

 servingRS-r16 SEQUENCE {

 servingCellId ServCellIndex OPTIONAL, -- Need S

 referenceSignal-r16 CHOICE {

 ssb-IndexServing-r16 SSB-Index,

 csi-RS-IndexServing-r16 NZP-CSI-RS-ResourceId,

 srs-SpatialRelation-r16 SEQUENCE {

 resourceSelection-r16 CHOICE {

 srs-ResourceId-r16 SRS-ResourceId,

 srs-PosResourceId-r16 SRS-PosResourceId-r16

 },

 uplinkBWP-r16 BWP-Id

 }

 }

 },

 ssb-Ncell-r16 SSB-InfoNcell-r16,

 dl-PRS-r16 DL-PRS-Info-r16

}

SSB-Configuration-r16 ::= SEQUENCE {

 ssb-Freq-r16 ARFCN-ValueNR,

 halfFrameIndex-r16 ENUMERATED {zero, one},

 ssbSubcarrierSpacing-r16 SubcarrierSpacing,

 ssb-Periodicity-r16 ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2,spare1 } OPTIONAL, -- Need S

 sfn0-Offset-r16 SEQUENCE {

 sfn-Offset-r16 INTEGER (0..1023),

 integerSubframeOffset-r16 INTEGER (0..9) OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 sfn-SSB-Offset-r16 INTEGER (0..15),

 ss-PBCH-BlockPower-r16 INTEGER (-60..50) OPTIONAL -- Cond Pathloss

}

SSB-InfoNcell-r16 ::= SEQUENCE {

 physicalCellId-r16 PhysCellId,

 ssb-IndexNcell-r16 SSB-Index OPTIONAL, -- Need S

 ssb-Configuration-r16 SSB-Configuration-r16 OPTIONAL -- Need S

}

DL-PRS-Info-r16 ::= SEQUENCE {

 dl-PRS-ID-r16 INTEGER (0..255),

 dl-PRS-ResourceSetId-r16 INTEGER (0..7),

 dl-PRS-ResourceId-r16 INTEGER (0..63) OPTIONAL -- Need S

}

SRS-ResourceId ::= INTEGER (0..maxNrofSRS-Resources-1)

SRS-PosResourceId-r16 ::= INTEGER (0..maxNrofSRS-PosResources-1-r16)

SRS-PeriodicityAndOffset ::= CHOICE {

 sl1 NULL,

 sl2 INTEGER(0..1),

 sl4 INTEGER(0..3),

 sl5 INTEGER(0..4),

 sl8 INTEGER(0..7),

 sl10 INTEGER(0..9),

 sl16 INTEGER(0..15),

 sl20 INTEGER(0..19),

 sl32 INTEGER(0..31),

 sl40 INTEGER(0..39),

 sl64 INTEGER(0..63),

 sl80 INTEGER(0..79),

 sl160 INTEGER(0..159),

 sl320 INTEGER(0..319),

 sl640 INTEGER(0..639),

 sl1280 INTEGER(0..1279),

 sl2560 INTEGER(0..2559)

}

SRS-PeriodicityAndOffset-r16 ::= CHOICE {

 sl1 NULL,

 sl2 INTEGER(0..1),

 sl4 INTEGER(0..3),

 sl5 INTEGER(0..4),

 sl8 INTEGER(0..7),

 sl10 INTEGER(0..9),

 sl16 INTEGER(0..15),

 sl20 INTEGER(0..19),

 sl32 INTEGER(0..31),

 sl40 INTEGER(0..39),

 sl64 INTEGER(0..63),

 sl80 INTEGER(0..79),

 sl160 INTEGER(0..159),

 sl320 INTEGER(0..319),

 sl640 INTEGER(0..639),

 sl1280 INTEGER(0..1279),

 sl2560 INTEGER(0..2559),

 sl5120 INTEGER(0..5119),

 sl10240 INTEGER(0..10239),

 sl40960 INTEGER(0..40959),

 sl81920 INTEGER(0..81919),

 ...

}

SRS-PeriodicityAndOffsetExt-r16 ::= CHOICE {

 sl128 INTEGER(0..127),

 sl256 INTEGER(0..255),

 sl512 INTEGER(0..511),

 sl20480 INTEGER(0..20479)

}

SpatialRelationInfo-PDC-r17 ::= SEQUENCE {

 referenceSignal CHOICE {

 ssb-Index SSB-Index,

 csi-RS-Index NZP-CSI-RS-ResourceId,

 dl-PRS-PDC NR-DL-PRS-ResourceID-r17,

 srs SEQUENCE {

 resourceId SRS-ResourceId,

 uplinkBWP BWP-Id

 },

 ...

 },

 ...

}

TxHoppingConfig-r18 ::= SEQUENCE {

 overlapValue-r18 ENUMERATED {zeroRB, oneRB, twoRB, fourRB},

 numberOfHops-r18 INTEGER(1..6),

 slotOffsetForRemainingHopsList-r18 SEQUENCE (SIZE (1..maxNrofHops-1-r18) ) OF SlotOffsetForRemainingHops-r18,

 ...

}

SlotOffsetForRemainingHops-r18 ::= SEQUENCE {

 slotOffsetRemainingHops-r18 CHOICE {

 aperiodic-r18 SEQUENCE {

 slotOffset-r18 INTEGER (1..32) OPTIONAL, -- Need S

 startPosition-r18 INTEGER (0..13) OPTIONAL, -- Need R

 ...

 },

 semi-persistent-r18 SEQUENCE {

 periodicityAndOffset-sp-r18 SRS-PeriodicityAndOffset-r16 OPTIONAL, -- Need R

 periodicityAndOffset-sp-Ext-r18 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL, -- Need R

 startPosition-r18 INTEGER (0..13) OPTIONAL, -- Need R

 ...

 },

 periodic-r18 SEQUENCE {

 periodicityAndOffset-p-r18 SRS-PeriodicityAndOffset-r16 OPTIONAL, -- Need R

 periodicityAndOffset-p-Ext-r18 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL, -- Need R

 startPosition-r18 INTEGER (0..13) OPTIONAL, -- Need S

 ...

 },

 ...

 }

}

-- TAG-SRS-CONFIG-STOP

-- ASN1STOP

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| --- |
| *SRS-Config* field descriptions |
| ***dci-TriggeringPosResourceSetLink***Indicates whether the single DCI-triggering SRS positioning resource sets across the linked carriers is enabled or not for bandwidth aggregation. |
| ***tpc-Accumulation***If the field is absent, UE applies TPC commands via accumulation. If disabled, UE applies the TPC command without accumulation (this applies to SRS when a separate closed loop is configured for SRS) (see TS 38.213 [13], clause 7.3). |

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| *SRS-Resource, SRS-PosResource* field descriptions |
| ***cyclicShift-n2***Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***cyclicShift-n4***Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***cyclicShift-n8***Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***combOffsetHopping***Configures UE with comb offset hopping. The *hoppingId* is used to initialize pseudo random comb offset hopping. If UE is configured with both comb offset and cyclic shift hopping, only one *hoppingId* is configured. The *hoppingWithRepetition* configures time-domain hopping behavior for repetition factor R>1. The *hoppingSubset* indicates a set of comb offset by a bit string (see clause 6.4.1.4.3 of TS 38.211 [16]). The *i*-th bit in the bit string is set to 1 to indicate the $s\_{coh}^{SRS}\left(t\right)=i-1$, where *t* is determined by its ordinary position among the positive bits in bit string, i.e., if the *i*-th bit is a first positive bit, *t=0*; if the *i*-th bit is a second positive bit, *t=1* , and so on. |
| ***cyclicShiftHopping***Configures UE with cyclic shift hopping. The *hoppingId* is used to initialize pseudo random cyclic shift hopping. If UE is configured with both comb offset and cyclic shift hopping, only one *hoppingId* is configured. The *hoppingFinerGranularity* enables finer granular hopping, see TS 38.211 [16], clause 6.4.1.4.2. If *hoppingSubset* is configured, *hoppingFinerGranularity* is not configured. The hoppingSubset indicates a set of cyclic shift by a bit string (see clause 6.4.1.4.2 of TS 38.211 [16]). The *i*-th bit in the bit string is set to 1 to indicate the $s\_{csh}^{SRS}\left(t\right)=i-1$, where *t* is determined by its ordinary position among the positive bits in bit string, i.e., if the *i*-th bit is a first positive bit, *t=0*; if the *i*-th bit is a second positive bit, *t=1* , and so on. |
| ***enableStartRBHopping***When this RRC parameter is configured, start RB location hopping is enabled for partial frequency sounding in different SRS frequency hopping periods for periodic/semi-persistent/aperiodic SRS as described in clause 6.4.1.4 in TS 38.211. |
| ***freqHopping***Includes parameters capturing SRS frequency hopping (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, the network always configures this field such that *b-hop* > *b-SRS*. For SRS for positioning configuration in multiple cells, the value of this field applies to all cells in the validity area. *c-SRS* Indicates the maximum bandwidth. When *TxHoppingConfig* is configured thevalid values for *c-SRS* are such that the maximum bandwidthis: 104 PRBs, 48 PRBs, 132 PRBs, 64 PRBs, for 15,30,60,120 KHz respectively. The same value for *c-SRS* is configured for all the hops when TxHoppingConfig is configured. |
| ***groupOrSequenceHopping***Parameter(s) for configuring group or sequence hopping (see TS 38.211 [16], clause 6.4.1.4.2). For CLI SRS-RSRP measurement, the network always configures this parameter to 'neither'. For SRS for positioning configuration in multiple cells, the value of this field applies to all cells in the validity area. |
| ***nrofSRS-Ports***Number of ports. For CLI SRS-RSRP measurement, the network always configures this parameter to 'port1'. |
| ***nrofSRS-Ports-n8***Number of ports if the number of antenna ports is 8. The value 'ports8' configures UE with 8 antenna ports and the value 'ports8tdm' configures the UE with 8 antenna ports which are partitioned into 2 subsets with each subset having 4 different ports, and the subsets are mapped to different OFDM symbols, see TS 38.211 [16], clause 6.4.1.4.2. If *combOffsetHopping-r18* or *cyclicShiftHopping-r18* is configured, this field is not set to *ports8tdm*. If this field is present UE ignores the field *nrofSRS-Ports*. |
| ***periodicityAndOffset-p, periodicityAndOffset-p-Ext***Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, *sl1280* and *sl2560* cannot be configured. For *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=15kHz, values *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz except when periodicity of 20480ms is configured.When *periodicityAndOffset-p-Ext* is present, *periodicityAndOffset-p* shall be ignored by the UE. |
| ***periodicityAndOffset-sp, periodicityAndOffset-sp-Ext***Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=15kHz, values *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz.When *periodicityAndOffset-sp-Ext* is present, *periodicityAndOffset-sp* shall be ignored by the UE. |
| ***ptrs-PortIndex***The PTRS port index for this SRS resource for non-codebook based UL MIMO. This is only applicable when the corresponding *PTRS-UplinkConfig* is set to CP-OFDM. The *ptrs-PortIndex* configured here must be smaller than the *maxNrofPorts* configured in the *PTRS-UplinkConfig* (see TS 38.214 [19], clause 6.2.3.1). This parameter is not applicable to CLI SRS-RSRP measurement. |
| ***resourceMapping***OFDM symbol location of the SRS resource within a slot including *nrofSymbols* (number of OFDM symbols), *startPosition* (value 0 refers to the last symbol, value 1 refers to the second last symbol, and so on) and *repetitionFactor* (see TS 38.214 [19], clause 6.2.1 and TS 38.211 [16], clause 6.4.1.4). The configured SRS resource does not exceed the slot boundary. If *resourceMapping-r16* is signalled, UE shall ignore the *resourceMapping* (without suffix). If *resourceMapping-r17* is signalled, *resourceMapping-r16* is not signalled and the UE shall ignore the *resourceMapping* (without suffix) and only the values of nrofSymbols which are integer multiples of the configured repetitionFactor can be configured. The network can only signal *repetitionFactor-v1730* if *resourceMapping-r17* is signalled. When *repetitionFactor-v1730* is signalled, the UE shall ignore *repetitionFactor-r17*. For CLI SRS-RSRP measurement, the network always configures *nrofSymbols* and *repetitionFactor* to 'n1'. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, the value of this field applies to all cells in the validity area. *nrofSymbols* is same for all the hops when *TxHoppingConfig* is configured. |
| ***resourceType***Periodicity and offset for semi-persistent and periodic SRS resource, or slot offset for aperiodic SRS resource for positioning (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, only 'periodic' is applicable for *resourceType*. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, the value of this field applies to all cells in the validity area. |
| ***sequenceId***Sequence ID used to initialize pseudo random group and sequence hopping (see TS 38.214 [19], clause 6.2.1). If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, the value of this field applies to all cells in the validity area. |
| ***slotOffset***An offset in number of slots between the triggering DCI and the actual transmission of this *SRS-PosResource*. If the field is absent the UE applies no offset (value 0). |
| ***spatialRelationInfo***Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS (see TS 38.214 [19], clause 6.2.1). This parameter is not applicable to CLI SRS-RSRP measurement. This field is not configured if *unifiedTCI-StateType* is configured for the serving cell. |
| ***spatialRelationInfo-PDC***Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS-PDC (see TS 38.214 [19], clause 6.2.1). The field is present in case of *resourceType=periodic* and *usagePDC-r17=true* in the *SRS-ResourceSet*, otherwise the field is absent. |
| ***spatialRelationInfoPos***Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS (see TS 38.214 [19], clause 6.2.1).If the IE *srs-ResourceId-Ext* is present, the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 63. Otherwise the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 31. |
| ***srs-PosPeriodicConfigHyperSFN-Index***Indicates even or odd hyper SFN in which the SRS for positioning is transmitted for the periodicity value of 20480m. If this field is not configured, the UE assumes that SRS for positioning periodictity longer than one Hyper SFN is not configured. |
| ***srs-RequestDCI-0-2***Indicate the number of bits for "SRS request" in DCI format 0\_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 0\_2 is applied. If the parameter *srs-RequestDCI-0-2* is configured to value 1, 1 bit is used to indicate one of the first two rows of Table 7.3.1.1.2-24 in TS 38.212 [17] for triggered aperiodic SRS resource set. If the value 2 is configured, 2 bits are used to indicate one of the rows of Table 7.3.1.1.2-24 in TS 38.212 [17]. When UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication. |
| ***srs-RequestDCI-1-2***Indicate the number of bits for "SRS request" in DCI format 1\_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 1\_2 is applied. When the UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication (see TS 38.214 [19], clause 6.1.1.2). |
| ***srs-ResourceSetToAddModListDCI-0-2***List of SRS resource set to be added or modified for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***srs-ResourceSetToReleaseListDCI-0-2***List of SRS resource set to be released for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***srs-TCI-State***Configuration of either a UL TCI state or a joint TCI state for the SRS resource. In case of *UL TCI-State*, refers to the TCI state defined in *ul-TCI-StateList* in the *BWP-UplinkDedicated* where the *SRS-Config* is configured. In case of joint TCI state, refers to a TCI state defined in *dl-OrJointTCI-StateList* in *pdsch-Config* of the *BWP-DownlinkDedicated* and serving cell indicated by *cellAndBWP*.This field is absent when the SRS resource is in an *SRS-ResourceSet* configured with *followUnifiedTCI-StateSRS-r17 or applyIndicatedTCI-State,* or when the field *unifiedTCI-StateType* is not configured to the serving cell which the SRS resource is located in. |
| ***startRBIndexAndFreqScalingFactor***Configures the UE with the startRBIndex and freqScalingFactor for partial frequency sounding as described in Clause 6.4.1.4 in TS 38.211. The startRBIndexForFScaling2 gives the startRBIndex when freqScalingFactor is 2 and the startRBIndexForFScaling4 gives the startRBIndex when FreqScalingFactor is 4  |
| ***transmissionComb, transmissionComb-n2, transmissionComb-n4, transmissionComb-n8***Comb value (2 or 4 or 8) and comb offset (0..combValue-1) (see TS 38.214 [19], clause 6.2.1). If network configures field *transmissionComb-n8*, the UE ignores *transmissionComb.* If *srs-PosRRC-InactiveValidityAreaPreConfig* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, the value of this field applies to all cells in the validity area. |

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| *SRS-ResourceSet, SRS-PosResourceSet* field descriptions |
| ***alpha***alpha value for SRS power control (see TS 38.213 [13], clause 7.3). When the field is absent the UE applies the value 1. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, the value of this field applies to all cells in the validity area. |
| ***aperiodicSRS-ResourceTriggerList***An additional list of DCI "code points" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6). When the field is not included during a reconfiguration of *SRS-ResourceSet* of *resourceType* set to *aperiodic*, UE maintains this value based on the Need M; that is, this list is not considered as an extension of *aperiodicSRS-ResourceTrigger* for purpose of applying the general rule for extended list in clause 6.1.3. |
| ***aperiodicSRS-ResourceTrigger***The DCI "code point" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6). |
| ***applyIndicatedTCI-State***This field indicates, for an SRS-ResourceSet, if UE applies the first or the second "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 6.2.1. |
| ***associatedCSI-RS***ID of CSI-RS resource associated with this SRS resource set in non-codebook based operation (see TS 38.214 [19], clause 6.1.1.2). |
| ***availableSlotOffsetList***Indicates a list of up to four different available slot offset values from slot n+k to the slot where the aperiodic SRS resource set is transmitted, where slot n is the slot with the triggering DCI, and k is the *slotOffset* (without suffix) as described in clause 6.2.1 of TS 38.214 [19]. |
| ***csi-RS***ID of CSI-RS resource associated with this SRS resource set (see TS 38.214 [19], clause 6.1.1.2). |
| ***dl-PRS***This field indicates a PRS configuration. |
| ***followUnifiedTCI-StateSRS***When set to enabled, for SRS resource Set, the UE applies the "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5. This parameter may be configured for aperiodic SRS for BM or SRS of any time-domain behavior for codebook, non-codebook, and antenna switching. |
| ***p0***P0 value for SRS power control. The value is in dBm. Only even values (step size 2) are allowed (see TS 38.213 [13], clause 7.3). If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, the value of this field applies to all cells in the validity area. |
| ***pathlossReferenceRS***A reference signal (e.g. a CSI-RS config or a SS block) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). |
| ***pathlossReferenceRS-Pos***A reference signal (e.g. a SS block or a DL-PRS config) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). |
| ***pathlossReferenceRSList***Multiple candidate pathloss reference RS(s) for SRS power control, where one candidate RS can be mapped to SRS Resource Set via MAC CE (clause 6.1.3.27 in TS 38.321 [3]). The network can only configure this field if *pathlossReferenceRS* is not configured in the same *SRS-ResourceSet*. |
| ***resourceType***Time domain behavior of SRS resource configuration, see TS 38.214 [19], clause 6.2.1. The network configures SRS resources in the same resource set with the same time domain behavior on periodic, aperiodic and semi-persistent SRS. The aperiodic SRS is not applicable for the UE in RRC\_INACTIVE. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, the value of this field applies to all cells in the validity area. |
| ***slotOffset***An offset in number of slots between the triggering DCI and the actual transmission of this *SRS-ResourceSet*. If the field is absent the UE applies no offset (value 0). |
| ***srs-PowerControlAdjustmentStates***Indicates whether hsrs,c(i) = fc(i,1) or hsrs,c(i) = fc(i,2) (if twoPUSCH-PC-AdjustmentStates are configured) or separate close loop is configured for SRS. This parameter is applicable only for Uls on which UE also transmits PUSCH. If absent or release, the UE applies the value sameAs-Fci1 (see TS 38.213 [13], clause 7.3). |
| ***srs-ResourceIdList, srs-PosResourceIdList***The IDs of the SRS-Resources/SRS-PosResource used in this *SRS-ResourceSet/SRS-PosResourceSet*. If this *SRS-ResourceSet* is configured with usage set to codebook, the *srs-ResourceIdList* contains at most 2 entries. If this *SRS-ResourceSet* is configured with *usage* set to *nonCodebook*, the *srs-ResourceIdList* contains at most 4 entries. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, *srs-PosResourceIdList* is commonly configured across cells within the validity area. |
| ***srs-ResourceSetId, srs-PosResourceSetId***The ID of this resource set. It is unique in the context of the BWP in which the parent *SRS-Config* is defined. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, *srs-PosResourceSetId* is commonly configured across cells within the validity area. |
| ***ssb-IndexServing***Indicates SSB index belonging to a serving cell where the SRS is configured. |
| ***ssb-Ncell***This field indicates a SSB configuration from neighboring cell. |
| ***usage***Indicates if the SRS resource set is used for beam management, codebook based or non-codebook based transmission or antenna switching. See TS 38.214 [19], clause 6.2.1. Reconfiguration between codebook based and non-codebook based transmission is not supported. |
| ***usagePDC***If configured, it indicates that this SRS resource set is used for propagation delay compensation. The field can be present in only one *SRS-ResourceSet*. |

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| *SRS-SpatialRelationInfoPos* field descriptions |
| ***csi-RS-IndexServing***Indicates CSI-RS index belonging to a serving cell. |
| ***dl-PRS***This field indicates a PRS configuration. |
| ***resourceSelection***Indicates whether the configured SRS spatial relation resource is a *SRS-Resource* or *SRS-PosResource*. |
| ***servingCellId***The serving Cell ID of the source SSB, CSI-RS, or SRS for the spatial relation of the target SRS resource. If this field is absent the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured. |
| ***ssb-IndexServing***Indicates SSB index belonging to a serving cell. |
| ***ssb-Ncell***This field indicates a SSB configuration from neighboring cell. |

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| *SSB-InfoNCell* field descriptions |
| ***physicalCellId***This field specifies the physical cell ID of the neighbour cell or NCD-SSB of the serving cell for which SSB configuration is provided. |
| ***ssb-IndexNcell***This field specifies the index of the SSB for a neighbour cell or NCD-SSB of the serving cell. See TS 38.213 [13]. If this field is absent, the UE determines the *ssb-IndexNcell* of the *physicalCellId*based on its SSB measurement from the cell. |
| ***ssb-Configuration***This field specifies the full configuration of the SSB. If this field is absent, the UE obtains the configuration for the SSB from *nr-SSB-Config* received as part of DL-PRS assistance data in LPP*,* see TS 37.355 [49], by looking up the corresponding SSB configuration using the field *physicalCellId*. |

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| *DL-PRS-Info* field descriptions |
| ***dl-PRS-ID***This field specifies the UE specific TRP ID (see TS 37.355 [49]) for which PRS configuration is provided.  |
| ***dl-PRS-ResourceSetId***This field specifies the PRS-ResourceSet ID of a PRS resourceSet. |
| ***dl-PRS-ResourceId***This field specifies the PRS-Resource ID of a PRS resource. If this field is absent, the UE determines the *dl-PRS-ResourceID* based on its PRS measurement from the TRP (see TS 37.355 [49]) and DL-PRS Resource Set. |

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| *SSB-Configuration* field descriptions |
| ***halfFrameIndex***Indicates whether SSB is in the first half or the second half of the frame. Value zero indicates the first half and value 1 indicates the second half. |
| ***integerSubframeOffset***Indicates the subframe boundary offset of the cell in which SSB is transmited. |
| ***sfn0-Offset***Indiactes the time offset of the SFN0 slot 0 for the cell with respect to SFN0 slot 0 of serving cell. |
| ***sfn-Offset***Specifies the SFN offset between the cell in which SSB is transmited and serving cell. The offset corresponds to the number of full radio frames counted from the beginning of a radio frame #0 of serving cell to the beginning of the closest subsequent radio frame #0 of the cell in which SSB is transmitted. |
| ***sfn-SSB-Offset***Indicates the SFN offset of the transmitted SSB relative to the start of the SSB period. Value 0 indicates that the SSB is transmitted in the first system frame, value 1 indicates that SSB is transmitted in the second system frame and so on. The network configures this field according to the field *ssb-Periodicity* such that the indicated system frame does not exceed the configured SSB periodicity. |
| ***ssb-Freq***Indicates the frequency of the SSB. |
| ***ss-PBCH-BlockPower***Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7. |
| ***ssb-Periodicity***Indicates the periodicity of the SSB. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1) |
| ***ssbSubcarrierSpacing***Subcarrier spacing of SSB.Only the following values are applicable depending on the used frequency:FR1: 15 or 30 kHzFR2-1: 120 or 240 kHzFR2-2: 120, 480, or 960 kHz |

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| *TxHoppingConfig* field descriptions |
| ***numberOfHops***This field specifies the number of hops. Value 1 indicates one hop, value 2 indicates two hops and so on. |
| ***overlapValue***This field specifies the overlap during SRS transmission in terms of number of *resource blocks*. Value *zeroRB* implies *0 RB*, value *oneRB* corresponds to *1 RB*, value *twoRB* corresponds to *2 RBs* and so on. The same value for the *overlapValue* is configured to all the hops. |
| ***slotOffsetForRemainingHopsList***This field specifies the starting slot offset and starting symbol for the SRS resource with tx hopping for different resource types (aperiodic, semi-persistent or periodic SRS transmission). Each hop is configured with the same periodicity. |

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| Conditional Presence | Explanation |
| *DLorJointTCI-SRS* | The field is mandatory present if srs-DLorJointTCI-State is configured, otherwise it is absent Need R. |
| *FollowUTCI* | The field is optionally present, Need R, if the field *followUnifiedTCI-StateSRS* is present. Otherwise, it is absent. |
| *NonCodebook* | This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent. |
| *Pathloss* | The field is mandatory present if the IE *SSB-InfoNcell* is included in *pathlossReferenceRS-Pos*; otherwise it is optionally present, Need R |
| *Setup* | This field is mandatory present upon configuration of SRS-ResourceSet or SRS-Resource and optionally present, Need M, otherwise. |