**3GPP TSG-RAN WG2 Meeting #109bis-e** ***R2-2004146***

**Electronic, 20 April – 30 April 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **1588** | **rev** | **-** | **Current version:** | **16.0.0** |  |
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| *For* [*HE**LP*](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  |  Correction to RRC spec for eURLLC |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_L1enh\_URLLC |  | ***Date:*** | 2020-04-16 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | RAN2 discussed the impacts of updated RAN1 RRC parameters and agreements based on LS R1-2001479 and R1-2001478 and RRC spec are updated accordingly.In addition, some corrections are identified and fixed in this CR as well. |
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| ***Summary of change:*** |  Updates to eURLLC L1 configurations from RAN1#100e.1. Issue R101: Remove Editor's note: FFS on intraRepetition for frequency hopping for PUSCH repetition type B based on RAN1 agreement that intra-PUSCH-repetition frequency hopping is not supported.
2. Issue R102: Remove Editor's note: FFS on CG Type 1 for frequency hopping indication based on RAN1 agreement that CG Type 2 frequency hopping follows the indication in Activation DCI as DG frequency hopping (R1-2001402).
3. Issue R103: Remove the RRC parameter CSI-AperiodicTriggerStateListForDCI-Format0-2 and semiPersistentOnPUSCH-TriggerStateListForDCI-Format0-2 and update the corresponding field descriptions.
4. Issue R104: Add reportSlotOffsetListForDCI-Format0-2 and reportSlotOffsetListForDCI-Format0-1 for aperiodic CSI report on PUSCH in CSI-ReportConfig because RAN1 decided to introduce these parameters for aperiodic CSI report on PUSCH as well as semi-persistent on PUSCH (R1-2001401). But, these parameters have been captured only for semi-persistent on PUSCH in the current RRC specification.
5. Issue R105: Remove Editor’s notes on numberOfRepetitions, length and startSymbol in PUSCH-TimeDomainResourceAllocationListNew, and add two values ‘3, 8’ for the numberOfRepetitions (R1-2001401).
6. Issue R106: Add the parameter and corresponding field description of AntennaPorts-FieldPresence for DCI format 1\_2.
7. Issue R107: Add the parameter and corresponding field description of AntennaPorts-FieldPresence for DCI format 0\_2.
8. Issue R108: Update the maximum UL CI monitoring periodicity from 5 slots to 10 slots based on RAN1 agreement and such a clarification can be moved to the description of monitoringSlotPeriodicityAndOffset in consistent with other DCIs.
9. Issue R109: Add values of n5, n10, n20, n35 an n42 for CI-PayloadSize and Remove the relevant Editor’notes
10. Issue R110: Add value of n14 for timeDurationForCI and Remove the relevant Editor’notes
11. Issue R111: Add the parameter and corresponding field description of deltaOffset.
12. Issue R112: RAN1 agreed when two PUCCH-Configs are configured, A PUCCH-ResourceId in a PUCCH-CSI-Resource refers to a PUCCH-Resource in the PUCCH-Config used for HARQ-ACK with low priority. The clarification should be added to the field description for PUCCH-CSI-Resource.
13. Issue R113: RAN1 agreed when two PUCCH-Configs are configured, A PUCCH-ResourceId in the multi-CSI-PUCCH-Resource list refers to a PUCCH-Resource in the PUCCH-Config used for HARQ-ACK with low priority. The clarification should be added to the field description for multi-CSI-PUCCH-CSI-ResourceList.
14. Issue R115: Remove the Editor’note based on RAN1 agreements on CSI, multi-CSI and SR.
15. Issue R116: Remove the Editor's note: It is not clear about how to use the pucch-ConfigurationList for PUCCH resources for SR and CSI in RAN2 understandings, for example, whether to use a PUCCH Config ID to indicate the corresponding pucch-Config in the pucch-ConfigurationList for a PUCCH resource. More RAN1 inputs are needed
 |
|  | 1. Issue R117: Add the clarification that different PUCCH Resource IDs are configured in different PUCCH-Config
2. Issue R118: Remove the Editor’ note: FFS on intraRepetition for frequencyHoppingForDCI-Format0-1.
3. Issue R119: Remove the Editor’note: FFS on intraRepetition for frequencyHoppingForDCI-Format0-2 if pusch-RepTypeIndicatorForDCI-Format0-2 is set to 'pusch-RepTypeB'.

Corrections to eURLLC L1 configurations.1. Issue R201: Typos in the following terminologies should be corrected.

dmrs-UplinkForPUSCH-MappingTypeA- ForDCI-Format0-2, dmrs-UplinkForPUSCH-MappingTypeB- ForDCI-Format0-2, dmrs-UplinkForPUSCH-MappingTypeA-Format0-2 and dmrs-UplinkForPUSCH-MappingTypeB-Format0-21. Issue R202: “-” is missing in DCI format 0-1/0-2 from the text below.

The IE PUSCH-TimeDomainResourceAllocationListNew is used to configure a time domain relation between PDCCH and PUSCH for DCI format 0-1/0-2.1. Issue R204: Remove formats0-1-And-1-1 in the value range of dci-FormatsExt to avoid redundancy with dci-Formats.
2. Issue R205: Remove the Editor’note of FFS formats0-0-And-1-0 since it is already included in dci-Formats.

The RILs relevant to URLLC WI are captured according to ASN,1 moderator inputs, including I650, I651, B002, I653 and I669. |
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| ***Consequences if not approved:*** | The RAN1 updates from L1 configurations are not reflected in RRC and some errors remains unfixed. |
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| ***Clauses affected:*** | 6.3.2 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** | **Y** |  |  Other core specifications  | TS 38.321 CR 0734  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

 *START OF CHANGES*

### 6.3.2 Radio resource control information elements

#### – *BWP-UplinkDedicated*

The IE *BWP-UplinkDedicated* is used to configure the dedicated (UE specific) parameters of an uplink BWP.

***BWP-UplinkDedicated* information element**

-- ASN1START

-- TAG-BWP-UPLINKDEDICATED-START

BWP-UplinkDedicated ::= SEQUENCE {

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

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

 configuredGrantConfig SetupRelease { ConfiguredGrantConfig } OPTIONAL, -- Need M

 srs-Config SetupRelease { SRS-Config } OPTIONAL, -- Need M

 beamFailureRecoveryConfig SetupRelease { BeamFailureRecoveryConfig } OPTIONAL, -- Cond SpCellOnly

 ...,

 [[

 cp-ExtensionC2-r16 INTEGER (1..28) OPTIONAL, -- Need R

 cp-ExtensionC3-r16 INTEGER (1..28) OPTIONAL, -- Need R

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

 pucch-ConfigurationList-r16 SetupRelease { PUCCH-ConfigurationList-r16 } OPTIONAL, -- Need M

 configuredGrantConfigList-r16 SetupRelease { ConfiguredGrantConfigList-r16 } OPTIONAL -- Need M

 ]]

}

-- TAG-BWP-UPLINKDEDICATED-STOP

-- ASN1STOP

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| ***BWP-UplinkDedicated* field descriptions** |
| ***beamFailureRecoveryConfig***Configuration of beam failure recovery. If *supplementaryUplink* is present, the field is present only in one of the uplink carriers, either UL or SUL. |
| ***configuredGrantConfig***A *Configured-Grant* of *type1* or *type2*. It may be configured for UL or SUL but in case of *type1* not for both at a time. Except for reconfiguration with sync, the NW does not reconfigure *configuredGrantConfig* when there is an active configured uplink grant Type 2 (see TS 38.321 [3]). However, the NW may release the *configuredGrantConfig* at any time. |
| ***configuredGrantConfigList***A list of multiple configured grant configurations for one BWP. Except for reconfiguration with sync, the NW does not reconfigure a Type 2 configured grant configuration when it is active (see TS 38.321 [3]). However, the NW may release a configured grant configuration at any time. |
| ***cp-ExtensionC2, cp-ExtensionC3***Configures the cyclic prefix (CP) extension (see TS 38.211 [16], clause 5.3.1). For 15 and 30 kHz SCS, {1..28} are valid. For 60 kHz SCS, {2..28} are valid. |
| ***pucch-Config***PUCCH configuration for one BWP of the normal UL or SUL of a serving cell. If the UE is configured with SUL, the network configures PUCCH only on the BWPs of one of the uplinks (normal UL or SUL). The network configures *PUCCH-Config* at least on non-initial BWP(s) for SpCell and PUCCH SCell. If supported by the UE, the network may configure at most one additional SCell of a cell group with *PUCCH-Config* (i.e. PUCCH SCell).In EN-DC, The NW configures at most one serving cell per frequency range with PUCCH. And in EN-DC, if two PUCCH groups are configured, the serving cells of the NR PUCCH group in FR2 use the same numerology.The NW may configure PUCCH for a BWP when setting up the BWP. The network may also add/remove the *pucch-Config* in an *RRCReconfiguration* with *reconfigurationWithSync* (for SpCell or PUCCH SCell) or with SCell release and add (for PUCCH SCell) to move the PUCCH between the UL and SUL carrier of one serving cell. In other cases, only modifications of a previously configured *pucch-Config* are allowed.If one (S)UL BWP of a serving cell is configured with PUCCH, all other (S)UL BWPs must be configured with PUCCH, too. |
| ***pucch-ConfigurationList***PUCCH configurations for two simultaneously constructed HARQ-ACK codebooks (see TS 38.213 [13], clause 9.1). Different PUCCH Resource IDs are configured in different *PUCCH-Config* within the *pucch-ConfigurationList* if configured. |
| ***pusch-Config***PUSCH configuration for one BWP of the normal UL or SUL of a serving cell. If the UE is configured with SUL and if it has a *PUSCH-Config* for both UL and SUL, an UL/SUL indicator field in DCI indicates which of the two to use. See TS 38.212 [17], clause 7.3.1. |
| ***srs-Config***Uplink sounding reference signal configuration. |
| ***useInterlacePUCCH-PUSCH***If the field is present, the UE uses uplink frequency domain resource allocation Type 2 for PUSCH (see 38.213 clause 8.3 and 38.214 clause 6.1.2.2) and uses interlaced PUCCH Format 0, 1, 2, and 3 for PUCCH (see TS 38.213 [13], clause 9.2.1). |

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

 *NEXT CHANGES*

– *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),

 ...,

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 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 R

 ]]

 } OPTIONAL, -- Need R

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

 cg-minDFI-Delay-r16 INTEGER (1..ffsValue) OPTIONAL, -- Need R Upper limit 7 FFS

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

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

 cg-StartingFullBW-InsideCOT-r16 ENUMERATED {ffs} OPTIONAL, -- Need R

 cg-StartingFullBW-OutsideCOT-r16 ENUMERATED {ffs} OPTIONAL, -- Need R

 cg-StartingPartialBW-InsideCOT-r16 ENUMERATED {ffs} OPTIONAL, -- Need R

 cg-StartingPartialBW-OutsideCOT-r16 ENUMERATED {ffs} OPTIONAL, -- Need R

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

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

 betaOffsetCG-UCI-r16 INTEGER (1..ffsValue) OPTIONAL, -- Need R

 cg-COT-SharingList-r16 SEQUENCE (SIZE (1..ffsValue)) 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, -- Need M

 configuredGrantConfigIndexMAC-r16 ConfiguredGrantConfigIndexMAC-r16 OPTIONAL, -- Need M

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

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

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

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

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}

CG-UCI-OnPUSCH ::= CHOICE {

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

 semiStatic BetaOffsets

}

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

 duration-r16 INTEGER (1..ffsValue),

 offset-r16 INTEGER (1..ffsValue),

 channelAccessPriority-r16 INTEGER (1..4)

}

-- 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. |
| ***autonomousReTx***If this field is present, the Configured Grant configuration is configured with autonomous retransmission, see TS 38.321 [3]. Editor's Note: The name *autonomousReTx* needs to be confirmed. |
| ***betaOffsetCG-UCI***Beta offset for CG-UCI in CG-PUSCH, see TS 38.213 [13], clause 9.3 |
| ***cg-COT-SharingOffset***Indicates the number of symbols from the end of the slot where the COT sharing indication in UCI is enabled. Applicable when *ULtoDL-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-minDFIDelay***Indicates the minimum duration (in unit of symbols) from the ending symbol of the CG-PUSCH to the starting symbol of the DFI carrying HARQ-ACK for that PUSCH. UE assumes HARQ-ACK is valid only for PUSCH transmissions ending before n-cg-DFIDelay-r16, where n is the time corresponding to the beginning of the start symbol of the DFI (see TS 38.213 [13], clause 10.3).. |
| ***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). |
| ***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-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 the value of *configuredGrantTimer.* This IE is always configured for configured grants on operation with shared spectrum channel access. |
| ***cg-StartingFullBW-InsideCOT***A set of configured grant PUSCH transmission starting offsets 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 offsets 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 offsets 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 offsets 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). |
| ***cg-UCI-Multiplexing***When configured, in the case of PUCCH overlapping with CG-PUSCH(s) within a PUCCH group, the CG-UCI and HARQ-ACK are jointly encoded (CG-UCI is treated as the same type as a HARQ-ACK). When not configured, In the case of PUCCH overlapping with CG-PUSCH(s) within a PUCCH group and PUCCH carries HARQ ACK feedback, configured grant PUSCH is skipped (see TS 38.214 [19], clause 6.3.2.1.4). |
| ***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). |
| ***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. |
| ***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* is set to the same value for all of configurations on this BWP. |
| ***dmrs-SeqInitialization***The network configures this field if *transformPrecoder* is disabled. 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* refers 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, 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-Offset2***Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.4.1. |
| ***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. |
| ***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. |
| ***p0-PUSCH-Alpha***Index of the *P0-PUSCH-AlphaSet* to be used for this configuration. |
| ***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} |
| ***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 field *periodicity* is ignored. 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. |
| ***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. |
| ***powerControlLoopToUse***Closed control loop to apply (see TS 38.213 [13], clause 7.1.1). |
| ***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). |
| ***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*. Otherwise, the field is absent. |
| ***repK***The number of repetitions of K. |
| ***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). Type 1 configured grant may be configured for UL or SUL, but not for both simultaneously. |
| ***srs-ResourceIndicator***Indicates the SRS resource to be used.  |
| ***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. |
| ***timeDomainAllocation***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. |
| ***timeDomainOffset***Offset related to the reference SFN indicated by *timeReferenceSFN*, see TS 38.321 [3], clause 5.8.2. If the field *timeReferenceSFN* is not present, the reference SFN is 0. |
| ***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.  |
| ***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*, 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.* |

|  |
| --- |
| ***CG-COT-Sharing* field descriptions** |
| ***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). |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *LCH-BasedPrioritization* | This fiels is optionally present, Need R, if *lch-BasedPrioritization* is configured in the MAC entity. It is absent otherwise. |
| *RepTypeB* | The field is optionally present if pusch-RepTypeIndicator is set to pusch-RepTypeB, Need S, and absent otherwise. |

*NEXT CHANGES*

– *CSI-MeasConfig*

The IE *CSI-MeasConfig* is used to configure CSI-RS (reference signals) belonging to the serving cell in which *CSI-MeasConfig* is included, channel state information reports to be transmitted on PUCCH on the serving cell in which *CSI-MeasConfig* is included and channel state information reports on PUSCH triggered by DCI received on the serving cell in which *CSI-MeasConfig* is included. See also TS 38.214 [19], clause 5.2.

***CSI-MeasConfig* information element**

-- ASN1START

-- TAG-CSI-MEASCONFIG-START

CSI-MeasConfig ::= SEQUENCE {

 nzp-CSI-RS-ResourceToAddModList SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-Resource OPTIONAL, -- Need N

 nzp-CSI-RS-ResourceToReleaseList SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-ResourceId OPTIONAL, -- Need N

 nzp-CSI-RS-ResourceSetToAddModList SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSet

 OPTIONAL, -- Need N

 nzp-CSI-RS-ResourceSetToReleaseList SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSetId

 OPTIONAL, -- Need N

 csi-IM-ResourceToAddModList SEQUENCE (SIZE (1..maxNrofCSI-IM-Resources)) OF CSI-IM-Resource OPTIONAL, -- Need N

 csi-IM-ResourceToReleaseList SEQUENCE (SIZE (1..maxNrofCSI-IM-Resources)) OF CSI-IM-ResourceId OPTIONAL, -- Need N

 csi-IM-ResourceSetToAddModList SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSets)) OF CSI-IM-ResourceSet OPTIONAL, -- Need N

 csi-IM-ResourceSetToReleaseList SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSets)) OF CSI-IM-ResourceSetId OPTIONAL, -- Need N

 csi-SSB-ResourceSetToAddModList SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSets)) OF CSI-SSB-ResourceSet OPTIONAL, -- Need N

 csi-SSB-ResourceSetToReleaseList SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSets)) OF CSI-SSB-ResourceSetId OPTIONAL, -- Need N

 csi-ResourceConfigToAddModList SEQUENCE (SIZE (1..maxNrofCSI-ResourceConfigurations)) OF CSI-ResourceConfig

 OPTIONAL, -- Need N

 csi-ResourceConfigToReleaseList SEQUENCE (SIZE (1..maxNrofCSI-ResourceConfigurations)) OF CSI-ResourceConfigId

 OPTIONAL, -- Need N

 csi-ReportConfigToAddModList SEQUENCE (SIZE (1..maxNrofCSI-ReportConfigurations)) OF CSI-ReportConfig OPTIONAL, -- Need N

 csi-ReportConfigToReleaseList SEQUENCE (SIZE (1..maxNrofCSI-ReportConfigurations)) OF CSI-ReportConfigId

 OPTIONAL, -- Need N

 reportTriggerSize INTEGER (0..6) OPTIONAL, -- Need M

 aperiodicTriggerStateList SetupRelease { CSI-AperiodicTriggerStateList } OPTIONAL, -- Need M

 semiPersistentOnPUSCH-TriggerStateList SetupRelease { CSI-SemiPersistentOnPUSCH-TriggerStateList } OPTIONAL, -- Need M

 ...,

 [[

 reportTriggerSizeForDCI-Format0-2-r16 INTEGER (0..6) OPTIONAL -- Need M

 ]]

}

-- TAG-CSI-MEASCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***CSI-MeasConfig* field descriptions** |
| ***aperiodicTriggerStateList***Contains trigger states for dynamically selecting one or more aperiodic and semi-persistent reporting configurations and/or triggering one or more aperiodic CSI-RS resource sets for channel and/or interference measurement (see TS 38.214 [19], clause 5.2.1). |
| ***csi-IM-ResourceSetToAddModList***Pool of *CSI-IM-ResourceSet* which can be referred to from *CSI-ResourceConfig* or from MAC CEs. |
| ***csi-IM-ResourceToAddModList***Pool of *CSI-IM-Resource* which can be referred to from *CSI-IM-ResourceSet*. |
| ***csi-ReportConfigToAddModList***Configured CSI report settings as specified in TS 38.214 [19] clause 5.2.1.1. |
| ***csi-ResourceConfigToAddModList***Configured CSI resource settings as specified in TS 38.214 [19] clause 5.2.1.2. |
| ***csi-SSB-ResourceSetToAddModList***Pool of CSI-SSB-ResourceSet which can be referred to from *CSI-ResourceConfig*. |
| ***nzp-CSI-RS-ResourceSetToAddModList***Pool of *NZP-CSI-RS-ResourceSet* which can be referred to from *CSI-ResourceConfig* or from MAC CEs. |
| ***nzp-CSI-RS-ResourceToAddModList***Pool of *NZP-CSI-RS-Resource* which can be referred to from *NZP-CSI-RS-ResourceSet*. |
| ***reportTriggerSize, reportTriggerSizeForDCI-Format0-2***Size of CSI request field in DCI (bits) (see TS 38.214 [19], clause 5.2.1.5.1). The field *reportTriggerSize* refers to DCI format 0\_1 and the field *reportTriggerSizeForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 5.2.1.5.1). |

 *NEXT CHANGES*

– *CSI-ReportConfig*

The IE *CSI-ReportConfig* is used to configure a periodic or semi-persistent report sent on PUCCH on the cell in which the *CSI-ReportConfig* is included, or to configure a semi-persistent or aperiodic report sent on PUSCH triggered by DCI received on the cell in which the *CSI-ReportConfig* is included (in this case, the cell on which the report is sent is determined by the received DCI). See TS 38.214 [19], clause 5.2.1.

***CSI-ReportConfig* information element**

-- ASN1START

-- TAG-CSI-REPORTCONFIG-START

CSI-ReportConfig ::= SEQUENCE {

 reportConfigId CSI-ReportConfigId,

 carrier ServCellIndex OPTIONAL, -- Need S

 resourcesForChannelMeasurement CSI-ResourceConfigId,

 csi-IM-ResourcesForInterference CSI-ResourceConfigId OPTIONAL, -- Need R

 nzp-CSI-RS-ResourcesForInterference CSI-ResourceConfigId OPTIONAL, -- Need R

 reportConfigType CHOICE {

 periodic SEQUENCE {

 reportSlotConfig CSI-ReportPeriodicityAndOffset,

 pucch-CSI-ResourceList SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource

 },

 semiPersistentOnPUCCH SEQUENCE {

 reportSlotConfig CSI-ReportPeriodicityAndOffset,

 pucch-CSI-ResourceList SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource

 },

 semiPersistentOnPUSCH SEQUENCE {

 reportSlotConfig ENUMERATED {sl5, sl10, sl20, sl40, sl80, sl160, sl320},

 reportSlotOffsetList SEQUENCE (SIZE (1.. maxNrofUL-Allocations)) OF INTEGER(0..32),

 p0alpha P0-PUSCH-AlphaSetId

 },

 aperiodic SEQUENCE {

 reportSlotOffsetList SEQUENCE (SIZE (1..maxNrofUL-Allocations)) OF INTEGER(0..32)

 }

 },

 reportQuantity CHOICE {

 none NULL,

 cri-RI-PMI-CQI NULL,

 cri-RI-i1 NULL,

 cri-RI-i1-CQI SEQUENCE {

 pdsch-BundleSizeForCSI ENUMERATED {n2, n4} OPTIONAL -- Need S

 },

 cri-RI-CQI NULL,

 cri-RSRP NULL,

 ssb-Index-RSRP NULL,

 cri-RI-LI-PMI-CQI NULL

 },

 reportFreqConfiguration SEQUENCE {

 cqi-FormatIndicator ENUMERATED { widebandCQI, subbandCQI } OPTIONAL, -- Need R

 pmi-FormatIndicator ENUMERATED { widebandPMI, subbandPMI } OPTIONAL, -- Need R

 csi-ReportingBand CHOICE {

 subbands3 BIT STRING(SIZE(3)),

 subbands4 BIT STRING(SIZE(4)),

 subbands5 BIT STRING(SIZE(5)),

 subbands6 BIT STRING(SIZE(6)),

 subbands7 BIT STRING(SIZE(7)),

 subbands8 BIT STRING(SIZE(8)),

 subbands9 BIT STRING(SIZE(9)),

 subbands10 BIT STRING(SIZE(10)),

 subbands11 BIT STRING(SIZE(11)),

 subbands12 BIT STRING(SIZE(12)),

 subbands13 BIT STRING(SIZE(13)),

 subbands14 BIT STRING(SIZE(14)),

 subbands15 BIT STRING(SIZE(15)),

 subbands16 BIT STRING(SIZE(16)),

 subbands17 BIT STRING(SIZE(17)),

 subbands18 BIT STRING(SIZE(18)),

 ...,

 subbands19-v1530 BIT STRING(SIZE(19))

 } OPTIONAL -- Need S

 } OPTIONAL, -- Need R

 timeRestrictionForChannelMeasurements ENUMERATED {configured, notConfigured},

 timeRestrictionForInterferenceMeasurements ENUMERATED {configured, notConfigured},

 codebookConfig CodebookConfig OPTIONAL, -- Need R

 dummy ENUMERATED {n1, n2} OPTIONAL, -- Need R

 groupBasedBeamReporting CHOICE {

 enabled NULL,

 disabled SEQUENCE {

 nrofReportedRS ENUMERATED {n1, n2, n3, n4} OPTIONAL -- Need S

 }

 },

 cqi-Table ENUMERATED {table1, table2, table3, spare1} OPTIONAL, -- Need R

 subbandSize ENUMERATED {value1, value2},

 non-PMI-PortIndication SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerConfig)) OF PortIndexFor8Ranks OPTIONAL, -- Need R

 ...,

 [[

 semiPersistentOnPUSCH-v1530 SEQUENCE {

 reportSlotConfig-v1530 ENUMERATED {sl4, sl8, sl16}

 } OPTIONAL -- Need R

 ]],

 [[

 semiPersistentOnPUSCH-v16xy SEQUENCE {

 reportSlotOffsetListForDCI-Format0-2-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)

 OPTIONAL, -- Need R

 reportSlotOffsetListForDCI-Format0-1-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)

 OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 aperiodic-v16xy SEQUENCE {

 reportSlotOffsetListForDCI-Format0-2-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)

 OPTIONAL, -- Need R

 reportSlotOffsetListForDCI-Format0-1-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)

 OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 reportQuantity-r16 CHOICE {

 cri-SINR-r16 NULL,

 ssb-Index-SINR-r16 NULL

 } OPTIONAL, -- Need R

 nrofReportedRS-ForSINR-r16 ENUMERATED {n1, n2, n3, n4} OPTIONAL, -- Need S

 codebookConfig-r16 CodebookConfig-r16 OPTIONAL -- Need R

 ]]

}

CSI-ReportPeriodicityAndOffset ::= CHOICE {

 slots4 INTEGER(0..3),

 slots5 INTEGER(0..4),

 slots8 INTEGER(0..7),

 slots10 INTEGER(0..9),

 slots16 INTEGER(0..15),

 slots20 INTEGER(0..19),

 slots40 INTEGER(0..39),

 slots80 INTEGER(0..79),

 slots160 INTEGER(0..159),

 slots320 INTEGER(0..319)

}

PUCCH-CSI-Resource ::= SEQUENCE {

 uplinkBandwidthPartId BWP-Id,

 pucch-Resource PUCCH-ResourceId

}

PortIndexFor8Ranks ::= CHOICE {

 portIndex8 SEQUENCE{

 rank1-8 PortIndex8 OPTIONAL, -- Need R

 rank2-8 SEQUENCE(SIZE(2)) OF PortIndex8 OPTIONAL, -- Need R

 rank3-8 SEQUENCE(SIZE(3)) OF PortIndex8 OPTIONAL, -- Need R

 rank4-8 SEQUENCE(SIZE(4)) OF PortIndex8 OPTIONAL, -- Need R

 rank5-8 SEQUENCE(SIZE(5)) OF PortIndex8 OPTIONAL, -- Need R

 rank6-8 SEQUENCE(SIZE(6)) OF PortIndex8 OPTIONAL, -- Need R

 rank7-8 SEQUENCE(SIZE(7)) OF PortIndex8 OPTIONAL, -- Need R

 rank8-8 SEQUENCE(SIZE(8)) OF PortIndex8 OPTIONAL -- Need R

 },

 portIndex4 SEQUENCE{

 rank1-4 PortIndex4 OPTIONAL, -- Need R

 rank2-4 SEQUENCE(SIZE(2)) OF PortIndex4 OPTIONAL, -- Need R

 rank3-4 SEQUENCE(SIZE(3)) OF PortIndex4 OPTIONAL, -- Need R

 rank4-4 SEQUENCE(SIZE(4)) OF PortIndex4 OPTIONAL -- Need R

 },

 portIndex2 SEQUENCE{

 rank1-2 PortIndex2 OPTIONAL, -- Need R

 rank2-2 SEQUENCE(SIZE(2)) OF PortIndex2 OPTIONAL -- Need R

 },

 portIndex1 NULL

}

PortIndex8::= INTEGER (0..7)

PortIndex4::= INTEGER (0..3)

PortIndex2::= INTEGER (0..1)

-- TAG-CSI-REPORTCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***CSI-ReportConfig* field descriptions** |
| ***carrier***Indicates in which serving cell the *CSI-ResourceConfig* indicated below are to be found. If the field is absent, the resources are on the same serving cell as this report configuration. |
| ***codebookConfig***Codebook configuration for Type-1 or Type-2 including codebook subset restriction. If the field *codebookConfig-r16* is present, UE shall ignore the *codebookConfig* (without suffix). |
| ***cqi-FormatIndicator***Indicates whether the UE shall report a single (wideband) or multiple (subband) CQI. (see TS 38.214 [19], clause 5.2.1.4). |
| ***cqi-Table***Which CQI table to use for CQI calculation (see TS 38.214 [19], clause 5.2.2.1). |
| ***csi-IM-ResourcesForInterference***CSI IM resources for interference measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only CSI-IM resources. The *bwp-Id* in that *CSI-ResourceConfig* is the same value as the *bwp-Id* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement*. |
| ***csi-ReportingBand***Indicates a contiguous or non-contiguous subset of subbands in the bandwidth part which CSI shall be reported for. Each bit in the bit-string represents one subband. The right-most bit in the bit string represents the lowest subband in the BWP. The choice determines the number of subbands (subbands3 for 3 subbands, subbands4 for 4 subbands, and so on) (see TS 38.214 [19], clause 5.2.1.4). This field is absent if there are less than 24 PRBs (no sub band) and present otherwise, the number of sub bands can be from 3 (24 PRBs, sub band size 8) to 18 (72 PRBs, sub band size 4). |
| ***dummy***This field is not used in the specification. If received it shall be ignored by the UE. |
| ***groupBasedBeamReporting***Turning on/off group beam based reporting (see TS 38.214 [19], clause 5.2.1.4). |
| ***non-PMI-PortIndication***Port indication for RI/CQI calculation. For each CSI-RS resource in the linked ResourceConfig for channel measurement, a port indication for each rank R, indicating which R ports to use. Applicable only for non-PMI feedback (see TS 38.214 [19], clause 5.2.1.4.2).The first entry in *non-PMI-PortIndication* corresponds to the NZP-CSI-RS-Resource indicated by the first entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the *CSI-ResourceConfig* whose *CSI-ResourceConfigId* is indicated in a CSI-MeasId together with the above *CSI-ReportConfigId*; the second entry in *non-PMI-PortIndication* corresponds to the NZP-CSI-RS-Resource indicated by the second entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig*, and so on until the NZP-CSI-RS-Resource indicated by the last entry in *nzp-CSI-RS-Resources* in the in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig*. Then the next entry corresponds to the NZP-CSI-RS-Resource indicated by the first entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the second entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig* and so on. |
| ***nrofReportedRS***The number (N) of measured RS resources to be reported per report setting in a non-group-based report. N <= N\_max, where N\_max is either 2 or 4 depending on UE capability.(see TS 38.214 [19], clause 5.2.1.4) When the field is absent the UE applies the value 1. |
| ***nrofReportedRS-ForSINR***The number (N) of measured RS resources to be reported per report setting. N <= N\_max (see TS 38.214 [19], clause x). When the field is absent the UE applies the value 1. |
| ***nzp-CSI-RS-ResourcesForInterference***NZP CSI RS resources for interference measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only NZP-CSI-RS resources. The *bwp-Id* in that *CSI-ResourceConfig* is the same value as the *bwp-Id* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement*. |
| ***p0alpha***Index of the p0-alpha set determining the power control for this CSI report transmission (see TS 38.214 [19], clause 6.2.1.2). |
| ***pdsch-BundleSizeForCSI***PRB bundling size to assume for CQI calculation when *reportQuantity* is CRI/RI/i1/CQI. If the field is absent, the UE assumes that no PRB bundling is applied (see TS 38.214 [19], clause 5.2.1.4.2). |
| ***pmi-FormatIndicator***Indicates whether the UE shall report a single (wideband) or multiple (subband) PMI. (see TS 38.214 [19], clause 5.2.1.4). |
| ***pucch-CSI-ResourceList***Indicates which PUCCH resource to use for reporting on PUCCH. |
| ***reportConfigType***Time domain behavior of reporting configuration. |
| ***reportFreqConfiguration***Reporting configuration in the frequency domain. (see TS 38.214 [19], clause 5.2.1.4). |
| ***reportQuantity***The CSI related quantities to report. see TS 38.214 [19], clause 5.2.1. If the field *reportQuantity-r16* is present, UE shall ignore *reportQuantity* (without suffix). |
| ***reportSlotConfig***Periodicity and slot offset (see TS 38.214 [19], clause 5.2.1.4). If the field *reportSlotConfig-v1530* is present, the UE shall ignore the value provided in *reportSlotConfig* (without suffix). |
| ***reportSlotOffsetList, reportSlotOffsetListForDCI-Format0-1***, ***reportSlotOffsetListForDCI-Format0-2***Timing offset Y for semi persistent reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config*. A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on. The first report is transmitted in slot n+Y, second report in n+Y+P, where P is the configured periodicity.Timing offset Y for aperiodic reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config*. A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on (see TS 38.214 [19], clause 6.1.2.1). The field *reportSlotOffsetList* refers to DCI format 0\_0, the field *reportSlotOffsetListForDCI-Format0-1* refers to DCI format 0\_1 and the field *reportSlotOffsetListForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 6.1.2.1). |
| ***resourcesForChannelMeasurement***Resources for channel measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only NZP-CSI-RS resources and/or SSB resources. This *CSI-ReportConfig* is associated with the DL BWP indicated by *bwp-Id* in that *CSI-ResourceConfig*. |
| ***subbandSize***Indicates one out of two possible BWP-dependent values for the subband size as indicated in TS 38.214 [19], table 5.2.1.4-2 . If *csi-ReportingBand* is absent, the UE shall ignore this field. |
| ***timeRestrictionForChannelMeasurements***Time domain measurement restriction for the channel (signal) measurements (see TS 38.214 [19], clause 5.2.1.1). |
| ***timeRestrictionForInterferenceMeasurements***Time domain measurement restriction for interference measurements (see TS 38.214 [19], clause 5.2.1.1). |

|  |
| --- |
| ***PortIndexFor8Ranks* field descriptions** |
| ***portIndex8***Port-Index configuration for up to rank 8. If present, the network configures port indexes for at least one of the ranks. |
| ***portIndex4***Port-Index configuration for up to rank 4. If present, the network configures port indexes for at least one of the ranks. |
| ***portIndex2***Port-Index configuration for up to rank 2. If present, the network configures port indexes for at least one of the ranks. |
| ***portIndex1***Port-Index configuration for rank 1. |

|  |
| --- |
| ***PUCCH-CSI-Resource* field descriptions** |
| ***pucch-Resource***PUCCH resource for the associated uplink BWP. Only PUCCH-Resource of format 2, 3 and 4 is supported. The actual PUCCH-Resource is configured in *PUCCH-Config* and referred to by its ID. When two *PUCCH-Config* are configured within *PUCCH-ConfigurationList*, *PUCCH-ResourceId* in a *PUCCH-CSI-Resource* refers to a PUCCH-Resource in the *PUCCH-Config* used for HARQ-ACK with low priority. |

 *NEXT CHANGES*

#### – *PDSCH-Config*

The *PDSCH-Config* IE is used to configure the UE specific PDSCH parameters.

*PDSCH-Config* information element

-- ASN1START

-- TAG-PDSCH-CONFIG-START

PDSCH-Config ::= SEQUENCE {

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

 dmrs-DownlinkForPDSCH-MappingTypeA SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

 dmrs-DownlinkForPDSCH-MappingTypeB SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

 tci-StatesToAddModList SEQUENCE (SIZE(1..maxNrofTCI-States)) OF TCI-State OPTIONAL, -- Need N

 tci-StatesToReleaseList SEQUENCE (SIZE(1..maxNrofTCI-States)) OF TCI-StateId OPTIONAL, -- Need N

 vrb-ToPRB-Interleaver ENUMERATED {n2, n4} OPTIONAL, -- Need S

 resourceAllocation ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},

 pdsch-TimeDomainAllocationList SetupRelease { PDSCH-TimeDomainResourceAllocationList } OPTIONAL, -- Need M

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

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

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

 rateMatchPatternGroup1 RateMatchPatternGroup OPTIONAL, -- Need R

 rateMatchPatternGroup2 RateMatchPatternGroup OPTIONAL, -- Need R

 rbg-Size ENUMERATED {config1, config2},

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

 maxNrofCodeWordsScheduledByDCI ENUMERATED {n1, n2} OPTIONAL, -- Need R

 prb-BundlingType CHOICE {

 staticBundling SEQUENCE {

 bundleSize ENUMERATED { n4, wideband } OPTIONAL -- Need S

 },

 dynamicBundling SEQUENCE {

 bundleSizeSet1 ENUMERATED { n4, wideband, n2-wideband, n4-wideband } OPTIONAL, -- Need S

 bundleSizeSet2 ENUMERATED { n4, wideband } OPTIONAL -- Need S

 }

 },

 zp-CSI-RS-ResourceToAddModList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-Resources)) OF ZP-CSI-RS-Resource

 OPTIONAL, -- Need N

 zp-CSI-RS-ResourceToReleaseList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-Resources)) OF ZP-CSI-RS-ResourceId

 OPTIONAL, -- Need N

 aperiodic-ZP-CSI-RS-ResourceSetsToAddModList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet

 OPTIONAL, -- Need N

 aperiodic-ZP-CSI-RS-ResourceSetsToReleaseList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId

 OPTIONAL, -- Need N

 sp-ZP-CSI-RS-ResourceSetsToAddModList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet

 OPTIONAL, -- Need N

 sp-ZP-CSI-RS-ResourceSetsToReleaseList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId

 OPTIONAL, -- Need N

 p-ZP-CSI-RS-ResourceSet SetupRelease { ZP-CSI-RS-ResourceSet }

 OPTIONAL, -- Need M

 ...,

 [[

 maxMIMO-Layers-r16 INTEGER (1..8) OPTIONAL, -- Need M

 minimumSchedulingOffsetK0-r16 SetupRelease { MinSchedulingOffsetK0-Values-r16 } OPTIONAL, -- Need M

 prb-BundlingTypeForDCI-Format1-2-r16 CHOICE {

 staticBundling-r16 SEQUENCE {

 bundleSize-r16 ENUMERATED { n4, wideband } OPTIONAL -- Need S

 },

 dynamicBundling-r16 SEQUENCE {

 bundleSizeSet1-r16 ENUMERATED { n4, wideband, n2-wideband, n4-wideband } OPTIONAL, -- Need S

 bundleSizeSet2-r16 ENUMERATED { n4, wideband } OPTIONAL -- Need S

 }

 } OPTIONAL, -- Need M

 rateMatchPatternGroup1ForDCI-Format1-2-r16 RateMatchPatternGroup OPTIONAL, -- Need R

 rateMatchPatternGroup2ForDCI-Format1-2-r16 RateMatchPatternGroup OPTIONAL, -- Need R

 aperiodicZP-CSI-RS-ResourceSetsToAddModListForDCI-Format1-2-r16 SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet OPTIONAL, -- Need N

 aperiodicZP-CSI-RS-ResourceSetsToReleaseListForDCI-Format1-2-r16 SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId OPTIONAL, -- Need N

 pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 SetupRelease { PDSCH-TimeDomainResourceAllocationList }

 OPTIONAL, -- Need M

 configurableFieldForDCI-Format1-2 SEQUENCE {

 harq-ProcessNumberSizeForDCI-Format1-2-r16 INTEGER (0..4) OPTIONAL, -- Need M

 dmrs-SequenceInitializationForDCI-Format1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 numberOfBitsForRV-ForDCI-Format1-2-r16 INTEGER (0..2) OPTIONAL, -- Need M

 antennaPortsFieldPresenceForDCI-Format1-2-r16 ENUMERATED (enabled) OPTIONAL, -- Need S

 ...

 },

 resourceAllocationType1GranularityForDCI-Format1-2-r16 ENUMERATED {n2,n4,n8,n16} OPTIONAL, -- Need S

 vrb-ToPRB-InterleaverForDCI-Format1-2-r16 ENUMERATED {n2, n4} OPTIONAL, -- Need S

 dmrs-DownlinkForPDSCH-MappingTypeAForDCI-Format1-2-r16 SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

 dmrs-DownlinkForPDSCH-MappingTypeBForDCI-Format1-2-r16 SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

 referenceOfSLIVForDCI-Format1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 mcs-TableForDCI-Format1-2-r16 ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 resourceAllocationForDCI-Format1-2-r16 ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},

 priorityIndicator SEQUENCE {

 priorityIndicatorForDCI-Format1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 priorityIndicatorForDCI-Format1-1-r16 ENUMERATED {enabled} OPTIONAL -- Need S

 } OPTIONAL, -- Need N

 dataScramblingIdentityPDSCH2-r16 INTEGER (0..1023) OPTIONAL, -- Need R

 pdsch-TimeDomainAllocationList-v16xy SetupRelease { PDSCH-TimeDomainResourceAllocationList-v16xy } OPTIONAL, -- Need M

 repetitionSchemeConfig-r16 SetupRelease { RepetitionSchemeConfig-r16} OPTIONAL -- Need M

 ]]

}

RateMatchPatternGroup ::= SEQUENCE (SIZE (1..maxNrofRateMatchPatternsPerGroup)) OF CHOICE {

 cellLevel RateMatchPatternId,

 bwpLevel RateMatchPatternId

}

MinSchedulingOffsetK0-Values-r16 ::= SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK0-SchedulingOffset-r16)

-- TAG-PDSCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *PDSCH-Config* field descriptions |
| ***antennaPortsFieldPresenceForDCI-Format1-2***Configure the presence of "Antenna ports" field in DCI format 1\_2. When the field is configured, then the "Antenna ports" field is present in DCI format 1\_2. Otherwise, the field size is set to 0 for DCI format 1\_2 (See TS 38.212 [17], clause 7.3.1.1.3). The parameter is used to enable 0 for "Antenna port(s)" in DCI format 1\_2 while one or more of *dmrs-DownlinkForPUSCH-MappingTypeAForDCI-Format1-2* and *dmrs-downlinkForPUSCH-MappingTypeBForDCI-Format1-2* is configured to a UE. If none of *dmrs-DownlinkForPUSCH-MappingTypeA-ForDCI-Format1-2* and *dmrs-DownlinkForPUSCH-MappingTypeB-ForDCI-Format1-2* is configured to the UE, then the parameter *antennaPortsFieldPresenceForDCI-Format1-2* is not configured neither. |
| ***aperiodic-ZP-CSI-RS-ResourceSetsToAddModList, aperiodic-ZP-CSI-RS-ResourceSetsToAddModListForDCI-Format1-2***AddMod/Release lists for configuring aperiodically triggered zero-power CSI-RS resource sets. Each set contains a *ZP-CSI-RS-ResourceSetId* and the IDs of one or more *ZP-CSI-RS-Resources* (the actual resources are defined in the *zp-CSI-RS-ResourceToAddModList*). The network configures the UE with at most 3 aperiodic *ZP-CSI-RS-ResourceSets* and it uses only the *ZP-CSI-RS-ResourceSetId* 1 to 3. The network triggers a set by indicating its *ZP-CSI-RS-ResourceSetId* in the DCI payload. The DCI codepoint '01' triggers the resource set with *ZP-CSI-RS-ResourceSetId* 1, the DCI codepoint '10' triggers the resource set with *ZP-CSI-RS-ResourceSetId 2*, and the DCI codepoint '11' triggers the resource set with *ZP-CSI-RS-ResourceSetId* 3 (see TS 38.214 [19], clause 5.1.4.2). The field *aperiodic-ZP-CSI-RS-ResourceSetsToAddModList* refers to DCI format 1\_1 and the field *aperiodic-ZP-CSI-RS-ResourceSetsToAddModListForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.214 [19], clause 5.1.4.2 and TS 38.212 [17] clause 7.3.1). |
| ***dataScramblingIdentityPDSCH, dataScramblingIdentityPDSCH2***Identifier(s) used to initialize data scrambling (c\_init) for PDSCH as specified in TS 38.211 [16], clause 7.3.1.1. The *dataScramblingIdentityPDSCH2* is configured if *coresetPoolIndex* is configured with 1 for at least one CORESET in the same BWP. |
| ***dmrs-DownlinkForPDSCH-MappingTypeA, dmrs-DownlinkForPDSCH-MappingTypeAForDCI-Format1-2***DMRS configuration for PDSCH transmissions using PDSCH mapping type A (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeA* refers to DCI format 1\_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeAForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-DownlinkForPDSCH-MappingTypeB, dmrs-DownlinkForPDSCH-MappingTypeBForDCI-Format1-2***DMRS configuration for PDSCH transmissions using PDSCH mapping type B (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeB* refers to DCI format 1\_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeBForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-SequenceInitializationForDCI-Format1\_2***Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 1\_2 If the field is absent, then the UE applies the value of 0 bit for the field "DMRS Sequence Initialization" in DCI format 1\_2. If the field is present, then the UE applies the value of 1 bit as in DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***harq-ProcessNumberSizeForDCI-Format1-2***Configure the number of bits for the field "HARQ process number" in DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***maxMIMO-Layers***Indicates the maximum MIMO layer configuration for a DL BWP. If present, this value overrides the *maxMIMO-Layers* configuration in IE *PDSCH-ServingCellConfig* when the UE operates in this BWP. If absent, the UE uses the *maxMIMO-Layers* configuration in IE *PDSCH-ServingCellConfig* when the UE operates in this BWP. The value of *maxMIMO-Layers* for a DL BWP shall be smaller than or equal to the value of *maxMIMO-Layers* configured in IE *PDSCH-ServingCellConfig* (if present). |
| ***maxNrofCodeWordsScheduledByDCI***Maximum number of code words that a single DCI may schedule. This changes the number of MCS/RV/NDI bits in the DCI message from 1 to 2. |
| ***mcs-Table, mcs-TableForDCI-Format1-2***Indicates which MCS table the UE shall use for PDSCH. (see TS 38.214 [19], clause 5.1.3.1). If the field is absent the UE applies the value 64QAM. The field *mcs-Table* refers to DCI format 1\_0 or DCI format 1\_1, and the field *mcs-TableForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.214 [19], clause 5.1.3.1). |
| ***minimumSchedulingOffsetK0***List of minimum K0 values. Minimum K0 parameter denotes minimum applicable value(s) for the TDRA table for PDSCH and for A-CSI RS triggering Offset(s) (see TS 38.214 [19], clause 5.3.1). |
| ***numberOfBitsForRV-ForDCI-Format1-2***Configures the number of bits for "Redundancy version" in the DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.1). |
| ***pdsch-AggregationFactor***Number of repetitions for data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent the UE applies the value 1. |
| ***pdsch-TimeDomainAllocationList, pdsch-TimeDomainAllocationListForDCI-Format1-2***List of time-domain configurations for timing of DL assignment to DL data (see table 5.1.2.1.1-1 in TS 38.214 [19]). The field *pdsch-TimeDomainAllocationList* refers to DCI format 1\_0 or DCI format 1\_1, and the field *pdsch-TimeDomainAllocationListForDCI-Format1-2* refers to DCI format 1\_2, respectively (see table 5.1.2.1.1-1A in TS 38.214 [19]).If the *pdsch-TimeDomainAllocationList-v16xy* is present, it shall contain the same number of entries, listed in the same order as in the *pdsch-TimeDomainAllocationList* (without suffix). |
| ***prb-BundlingType,*** ***prb-BundlingTypeForDCI-Format1-2***Indicates the PRB bundle type and bundle size(s) (see TS 38.214 [19], clause 5.1.2.3). If *dynamic* is chosen, the actual *bundleSizeSet1 or bundleSizeSet2* to use is indicated via DCI. Constraints on *bundleSize(Set)* setting depending on *vrb-ToPRB-Interleaver* and *rbg-Size* settings are described in TS 38.214 [19], clause 5.1.2.3. If a *bundleSize(Set)* value is absent, the UE applies the value *n2*. The field *prb-BundlingType* refers to DCI format 1\_1, and the field *prb-BundlingTypeForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.3). |
| ***priorityIndicatorForDCI-Format1-1, priorityIndicatorForDCI-Format1-2***Configure the presence of "priority indicator" in DCI format 1\_1/1\_2. When the field is absent in the IE, then 0 bit for "priority indicator" in DCI format 1\_1/1\_2. The field *priorityIndicatorForDCI-Format1-1* refers to DCI format 1\_1 and the field *priorityIndicatorForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9). |
| ***p-ZP-CSI-RS-ResourceSet***A set of periodically occurring ZP-CSI-RS-Resources (the actual resources are defined in the zp-CSI-RS-ResourceToAddModList). The network uses the ZP-CSI-RS-ResourceSetId=0 for this set. |
| ***rateMatchPatternGroup1, rateMatchPatternGroup1ForDCI-Format1-2***The IDs of a first group of *RateMatchPatterns* defined in *PDSCH-Config*->*rateMatchPatternToAddModList* (BWP level) or in *ServingCellConfig* ->*rateMatchPatternToAddModLis*t (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field *rateMatchPatternGroup1* refers to DCI format 1\_1, and the field *rateMatchPatternGroup1ForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.214 [19], clause 5.1.4.1). |
| ***rateMatchPatternGroup2, rateMatchPatternGroup2ForDCI-Format1-2***The IDs of a second group of *RateMatchPatterns* defined in *PDSCH-Config*->*rateMatchPatternToAddModList* (BWP level) or in *ServingCellConfig* ->*rateMatchPatternToAddModLis*t (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field *rateMatchPatternGroup2* refers to DCI format 1\_1, and the field *rateMatchPatternGroup2ForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.214 [19], clause 5.1.4.1). |
| ***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 (see TS 38.214 [19], clause 5.1.4.1). |
| ***rbg-Size***Selection between config 1 and config 2 for RBG size for PDSCH. The UE ignores this field if *resourceAllocation* is set to *resourceAllocationType1* (see TS 38.214 [19], clause 5.1.2.2.1). |
| ***referenceOfSLIVForDCI-Format1-2***Enable using the starting symbol of the PDCCH monitoring occasion in which the DL assignment is detected as the reference of the SLIV for DCI format 1\_2. When the RRC parameter enables the utilization of the new reference, the new reference is applied for TDRA entries with K0=0. Other entries with K0>0 can also be included in the same TDRA table. For other entries (if any) in the same TDRA table, the reference is slot boundary as in Rel-15. PDSCH mapping type A is not supported with the new reference. The new reference of SLIV is not configured for a serving cell configured to be scheduled by cross-carrier scheduling on a scheduling cell with different numerology (see TS 38.212 [17] clause 7.3.1 and TS 38.214 [19] clause 5.1.2.1). |
| ***repetitionSchemeConfig***Configure the UE with repetition schemes |
| ***resourceAllocation, resourceAllocationForDCI-Format1-2***Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 5.1.2.2). The field *resourceAllocation* refers to DCI format 1\_1, and the field *resourceAllocationForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.214 [19], clause 5.1.2.2). |
| ***resourceAllocationType1GranularityForDCI-Format1-2***Configure the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 1\_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 5.1.2.2.2). |
| ***sp-ZP-CSI-RS-ResourceSetsToAddModList***AddMod/Release lists for configuring semi-persistent zero-power CSI-RS resource sets. Each set contains a *ZP-CSI-RS-ResourceSetId* and the IDs of one or more *ZP-CSI-RS-Resources* (the actual resources are defined in the *zp-CSI-RS-ResourceToAddModList*) (see TS 38.214 [19], clause 5.1.4.2). |
| ***tci-StatesToAddModList***A list of Transmission Configuration Indicator (TCI) states indicating a transmission configuration which includes QCL-relationships between the DL RSs in one RS set and the PDSCH DMRS ports (see TS 38.214 [19], clause 5.1.5). |
| ***vrb-ToPRB-Interleaver, vrb-ToPRB-InterleaverForDCI-Format1-2***Interleaving unit configurable between 2 and 4 PRBs (see TS 38.211 [16], clause 7.3.1.6). When the field is absent, the UE performs non-interleaved VRB-to-PRB mapping. The field *vrb-ToPRB-Interleaver* refers to DCI format 1\_1, and the field *vrb-ToPRB-InterleaverForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.211 [16], clause 7.3.1.6). |
| ***zp-CSI-RS-ResourceToAddModList***A list of Zero-Power (ZP) CSI-RS resources used for PDSCH rate-matching. Each resource in this list may be referred to from only one type of resource set, i.e., aperiodic, semi-persistent or periodic (see TS 38.214 [19]). |

 *NEXT CHANGES*

– *PUCCH-Config*

The IE *PUCCH-Config* is used to configure UE specific PUCCH parameters (per BWP).

***PUCCH-Config* information element**

-- ASN1START

-- TAG-PUCCH-CONFIG-START

PUCCH-Config ::= SEQUENCE {

 resourceSetToAddModList SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceSets)) OF PUCCH-ResourceSet OPTIONAL, -- Need N

 resourceSetToReleaseList SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceSets)) OF PUCCH-ResourceSetId OPTIONAL, -- Need N

 resourceToAddModList SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-Resource OPTIONAL, -- Need N

 resourceToReleaseList SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-ResourceId OPTIONAL, -- Need N

 format1 SetupRelease { PUCCH-FormatConfig } OPTIONAL, -- Need M

 format2 SetupRelease { PUCCH-FormatConfig } OPTIONAL, -- Need M

 format3 SetupRelease { PUCCH-FormatConfig } OPTIONAL, -- Need M

 format4 SetupRelease { PUCCH-FormatConfig } OPTIONAL, -- Need M

 schedulingRequestResourceToAddModList SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfig

 OPTIONAL, -- Need N

 schedulingRequestResourceToReleaseList SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceId

 OPTIONAL, -- Need N

 multi-CSI-PUCCH-ResourceList SEQUENCE (SIZE (1..2)) OF PUCCH-ResourceId OPTIONAL, -- Need M

 dl-DataToUL-ACK SEQUENCE (SIZE (1..8)) OF INTEGER (0..15) OPTIONAL, -- Need M

 spatialRelationInfoToAddModList SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos)) OF PUCCH-SpatialRelationInfo

 OPTIONAL, -- Need N

 spatialRelationInfoToReleaseList SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos)) OF PUCCH-SpatialRelationInfoId

 OPTIONAL, -- Need N

 pucch-PowerControl PUCCH-PowerControl OPTIONAL, -- Need M

 ...,

 [[

 resourceToAddModList-r16 SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-Resource-r16 OPTIONAL, -- Need N

 dl-DataToUL-ACK-r16 SEQUENCE (SIZE (1..8)) OF INTEGER (-1..15) OPTIONAL, -- Need M

 dl-DCI-triggered-UL-ChannelAccess-CPext-r16 SEQUENCE (SIZE (1..16)) OF INTEGER (0..15) OPTIONAL, -- Need M

 subslotLengthForPUCCH-r16 ENUMERATED {n2,n7} OPTIONAL, -- Need M

 dl-DataToUL-ACK-ForDCI-Format1-2-r16 SEQUENCE (SIZE (1..8)) OF INTEGER (0..15) OPTIONAL, -- Need M

 numberOfBitsForPUCCH-ResourceIndicatorForDCI-Format1-2-r16 INTEGER (0..3) OPTIONAL, -- Need M

 dmrs-UplinkTransformPrecodingPUCCH-r16 ENUMERATED {enabled} OPTIONAL, -- Cond PI2-BPSK

 spatialRelationInfoToAddModList-r16 PUCCH-SpatialRelationInfoList-r16 OPTIONAL, -- Need N

 spatialRelationInfoToReleaseList-r16 PUCCH-SpatialRelationInfoIdList-r16 OPTIONAL, -- Need N

 resourceGroupToAddModList-r16 SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceGroups-r16)) OF PUCCH-ResourceGroup-r16

 OPTIONAL, -- Need N

 resourceGroupToReleaseList-r16 SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceGroups-r16)) OF PUCCH-ResourceGroupId-r16

 OPTIONAL -- Need N

 ]]

}

PUCCH-FormatConfig ::= SEQUENCE {

 interslotFrequencyHopping ENUMERATED {enabled} OPTIONAL, -- Need R

 additionalDMRS ENUMERATED {true} OPTIONAL, -- Need R

 maxCodeRate PUCCH-MaxCodeRate OPTIONAL, -- Need R

 nrofSlots ENUMERATED {n2,n4,n8} OPTIONAL, -- Need S

 pi2BPSK ENUMERATED {enabled} OPTIONAL, -- Need R

 simultaneousHARQ-ACK-CSI ENUMERATED {true} OPTIONAL -- Need R

}

PUCCH-MaxCodeRate ::= ENUMERATED {zeroDot08, zeroDot15, zeroDot25, zeroDot35, zeroDot45, zeroDot60, zeroDot80}

-- A set with one or more PUCCH resources

PUCCH-ResourceSet ::= SEQUENCE {

 pucch-ResourceSetId PUCCH-ResourceSetId,

 resourceList SEQUENCE (SIZE (1..maxNrofPUCCH-ResourcesPerSet)) OF PUCCH-ResourceId,

 maxPayloadSize INTEGER (4..256) OPTIONAL -- Need R

}

PUCCH-ResourceSetId ::= INTEGER (0..maxNrofPUCCH-ResourceSets-1)

PUCCH-Resource ::= SEQUENCE {

 pucch-ResourceId PUCCH-ResourceId,

 startingPRB PRB-Id,

 intraSlotFrequencyHopping ENUMERATED { enabled } OPTIONAL, -- Need R

 secondHopPRB PRB-Id OPTIONAL, -- Need R

 format CHOICE {

 format0 PUCCH-format0,

 format1 PUCCH-format1,

 format2 PUCCH-format2,

 format3 PUCCH-format3,

 format4 PUCCH-format4

 }

}

PUCCH-Resource-r16 ::= SEQUENCE {

 pucch-ResourceId PUCCH-ResourceId,

 interlaceAllocation-r16 SEQUENCE {

 rb-SetIndex INTEGER (0..4),

 interlace0 CHOICE {

 scs15 INTEGER (0..9),

 scs30 INTEGER (0..4)

 }

 },

 format CHOICE {

 format0 PUCCH-format0,

 format1 PUCCH-format1,

 format2 PUCCH-format2-r16,

 format3 PUCCH-format3-r16,

 format4 PUCCH-format4

 }

}

PUCCH-ResourceId ::= INTEGER (0..maxNrofPUCCH-Resources-1)

PUCCH-format0 ::= SEQUENCE {

 initialCyclicShift INTEGER(0..11),

 nrofSymbols INTEGER (1..2),

 startingSymbolIndex INTEGER(0..13)

}

PUCCH-format1 ::= SEQUENCE {

 initialCyclicShift INTEGER(0..11),

 nrofSymbols INTEGER (4..14),

 startingSymbolIndex INTEGER(0..10),

 timeDomainOCC INTEGER(0..6)

}

PUCCH-format2 ::= SEQUENCE {

 nrofPRBs INTEGER (1..16),

 nrofSymbols INTEGER (1..2),

 startingSymbolIndex INTEGER(0..13)

}

PUCCH-format2-r16 ::= SEQUENCE {

 nrofSymbols INTEGER (1..2),

 startingSymbolIndex INTEGER (0..13),

 interlace1-r16 INTEGER (0..9) OPTIONAL, -- Need M

 occ-Length-r16 OCC-Length-r16 OPTIONAL, -- Need M

 occ-Index-r16 OCC-Index-r16 OPTIONAL -- Need M

}

PUCCH-format3 ::= SEQUENCE {

 nrofPRBs INTEGER (1..16),

 nrofSymbols INTEGER (4..14),

 startingSymbolIndex INTEGER(0..10)

}

PUCCH-format3-r16 ::= SEQUENCE {

 nrofSymbols INTEGER (4..14),

 startingSymbolIndex INTEGER (0..10),

 interlace1-r16 INTEGER (0..9) OPTIONAL, -- Need M

 occ-Length-r16 OCC-Length-r16 OPTIONAL, -- Need M

 occ-Index-r16 OCC-Index-r16 OPTIONAL -- Need M

}

PUCCH-format4 ::= SEQUENCE {

 nrofSymbols INTEGER (4..14),

 occ-Length ENUMERATED {n2,n4},

 occ-Index ENUMERATED {n0,n1,n2,n3},

 startingSymbolIndex INTEGER(0..10)

}

OCC-Length-r16 ::= ENUMERATED {n2,n4}

OCC-Index-r16 ::= ENUMERATED {n0,n1,n2,n3}

PUCCH-SpatialRelationInfoList-r16 ::= SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos-r16)) OF PUCCH-SpatialRelationInfo-r16

PUCCH-SpatialRelationInfoIdList-r16 ::= SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos-r16)) OF PUCCH-SpatialRelationInfoId-r16

PUCCH-ResourceGroup-r16 ::= SEQUENCE {

 pucch-ResourceGroupId-r16 PUCCH-ResourceGroupId-r16,

 resourcePerGroupList-r16 SEQUENCE (SIZE (1..maxNrofPUCCH-ResourcesPerGroup-r16)) OF PUCCH-ResourceId

}

PUCCH-ResourceGroupId-r16 ::= INTEGER (0..maxNrofPUCCH-ResourceGroups-1-r16)

-- TAG-PUCCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***PUCCH-Config* field descriptions** |
| ***dl-DataToUL-ACK, dl-DataToUL-ACK-ForDCI-Format1-2***List of timing for given PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field *dl-DataToUL-ACK* refers to DCI format 1\_1 and the field *dl-DataToUL-ACKForDCI-Format1-2* refers to DCI format 1\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3). |
| ***dl-dci-triggered-UL-ChannelAccess-CPext***List of the combinations of CP extension and UL channel access type (See TS 38.212 [17], Clause 7.3.1). |
| ***dmrs-UplinkTransformPrecodingPUCCH***This field is used for PUCCH formats 3 and 4 according to TS 38.211, Clause 6.4.1.3.3.1. |
| ***format1***Parameters that are common for all PUCCH resources of format 1. |
| ***format2***Parameters that are common for all PUCCH resources of format 2. |
| ***format3***Parameters that are common for all PUCCH resources of format 3. |
| ***format4.***Parameters that are common for all PUCCH resources of format 4 |
| ***multi-CSI-PUCCH-ResourceList***When two *PUCCH-Config* are configured within *PUCCH-ConfigurationList*, *multi-CSI-PUCCH-ResourceList* is only configured in the *PUCCH-Config* used for HARQ-ACK with low priority. A *PUCCH-ResourceId* in the *multi-CSI-PUCCH-ResourceList* refers to a PUCCH-Resource in the *PUCCH-Config* used for HARQ-ACK with low priority. |
| ***numberOfBitsForPUCCH-ResourceIndicatorForDCI-Format1-2***Configuration of the number of bits for "PUCCH resource indicator" in DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3). |
| ***resourceGroupToAddModList, resourceGroupToReleaseList***Lists for adding and releasing groups of PUCCH resources that can be updated simultaneously for spatial relations with a MAC CE |
| ***resourceSetToAddModList, resourceSetToReleaseList***Lists for adding and releasing PUCCH resource sets (see TS 38.213 [13], clause 9.2). |
| ***resourceToAddModList, resourceToReleaseList***Lists for adding and releasing PUCCH resources applicable for the UL BWP and serving cell in which the *PUCCH-Config* is defined. The resources defined herein are referred to from other parts of the configuration to determine which resource the UE shall use for which report. |
| ***spatialRelationInfoToAddModList***Configuration of the spatial relation between a reference RS and PUCCH. Reference RS can be SSB/CSI-RS/SRS. If the list has more than one element, MAC-CE selects a single element (see TS 38.321 [3], clause 5.18.8 and TS 38.213 [13], clause 9.2.2). |
| ***subslotLengthForPUCCH***Indicate the sub-slot length for sub-slot based PUCCH feedback in number of symbols (see TS 38.213 [13], clause 9.1). Value *n2* corresponds to 2 symbols, value *n7* corresponds to 7 symbols. |

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| ***PUCCH-format3* field descriptions** |
| ***interlace1***A second interlace, in addition to interlace 0, as specified in TS 38.213 [13], clause 9.2.1. For 15KHz SCS, values {0..9} are applicable; for 30Khz SCS, values {0..4} are applicable. For 15kHz SCS, the values of *interlace1* shall satisfy *interlace1*=mod(*interlace0*+X,10) where X=1, -1, or 5. |
| ***nrofPRBs***The supported values are 1,2,3,4,5,6,8,9,10,12,15 and 16. |
| ***occ-Index***Indicates the orthogonal cover code index (see TS 38.213 [13], clause 9.2.1). Applicable when *useInterlacePUCCH-Dedicated-r16* is configured and *interlace1* is not configured. |
| ***occ-Length***Indicates the orthogonal cover code length (see TS 38.213 [13], clause 9.2.1). Applicable when *useInterlacePUCCH-Dedicated-r16* is configured and *interlace1* is not configured. |

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| ***PUCCH-FormatConfig* field descriptions** |
| ***additionalDMRS***If the field is present, the UE enables 2 DMRS symbols per hop of a PUCCH Format 3 or 4 if both hops are more than X symbols when FH is enabled (X=4). And it enables 4 DMRS symbols for a PUCCH Format 3 or 4 with more than 2X+1 symbols when FH is disabled (X=4). The field is not applicable for format 1 and 2. See TS 38.213 [13], clause 9.2.2. |
| ***interlace0***This is the only interlace of interlaced PUCCH Format 0 and 1 and the first interlace for interlaced PUCCH Format 2 and 3. |
| ***interslotFrequencyHopping***If the field is present, the UE enables inter-slot frequency hopping when PUCCH Format 1, 3 or 4 is repeated over multiple slots. For long PUCCH over multiple slots, the intra and inter slot frequency hopping cannot be enabled at the same time for a UE. The field is not applicable for format 2. See TS 38.213 [13], clause 9.2.6. |
| ***maxCodeRate***Max coding rate to determine how to feedback UCI on PUCCH for format 2, 3 or 4. The field is not applicable for format 1. See TS 38.213 [13], clause 9.2.5. |
| ***nrofSlots***Number of slots with the same PUCCH F1, F3 or F4. When the field is absent the UE applies the value *n1*. The field is not applicable for format 2. See TS 38.213 [13], clause 9.2.6. |
| ***pi2BPSK***If the field is present, the UE uses pi/2 BPSK for UCI symbols instead of QPSK for PUCCH. The field is not applicable for format 1 and 2. See TS 38.213 [13], clause 9.2.5. |
| ***rb-SetIndex***Indicates the RB set where the first interlace allocated for a PUCCH resource. |
| ***simultaneousHARQ-ACK-CSI***If the field is present, the UE uses simultaneous transmission of CSI and HARQ-ACK feedback with or without SR with PUCCH Format 2, 3 or 4. See TS 38.213 [13], clause 9.2.5. When the field is absent the UE applies the value *off.* The field is not applicable for format 1. |

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| ***PUCCH-Resource* field descriptions** |
| ***format***Selection of the PUCCH format (format 0 – 4) and format-specific parameters, see TS 38.213 [13], clause 9.2. *format0* and *format1* are only allowed for a resource in a first PUCCH resource set. *format2*, *format3* and *format4* are only allowed for a resource in non-first PUCCH resource set. |
| ***intraSlotFrequencyHopping***Enabling intra-slot frequency hopping, applicable for all types of PUCCH formats. For long PUCCH over multiple slots, the intra and inter slot frequency hopping cannot be enabled at the same time for a UE. See TS 38.213 [13], clause 9.2.1. |
| ***pucch-ResourceId***Identifier of the PUCCH resource. |
| ***secondHopPRB***Index of first PRB after frequency hopping of PUCCH. This value is applicable for intra-slot frequency hopping (see TS 38.213 [13], clause 9.2.1) or inter-slot frequency hopping (see TS 38.213 [13], clause 9.2.6). |

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| ***PUCCH-ResourceSet* field descriptions** |
| ***maxPayloadSize***Maximum number of UCI information bits that the UE may transmit using this PUCCH resource set (see TS 38.213 [13], clause 9.2.1). In a PUCCH occurrence, the UE chooses the first of its *PUCCH-ResourceSet* which supports the number of bits that the UE wants to transmit. The field is absent in the first set (Set0) and in the last configured set since the UE derives the maximum number of UCI information bits as specified in TS 38.213 [13], clause 9.2.1. This field can take integer values that are multiples of 4. |
| ***resourceList***PUCCH resources of *format0* and *format1* are only allowed in the first PUCCH resource set, i.e., in a PUCCH-ResourceSet with *pucch-ResourceSetId* = 0. This set may contain between 1 and 32 resources. PUCCH resources of *format2*, *format3* and *format4* are only allowed in a *PUCCH-ResourceSet* with *pucch-ResourceSetId* > 0. If present, these sets contain between 1 and 8 resources each. The UE chooses a *PUCCH-Resource* from this list as specified in TS 38.213 [13], clause 9.2.3. Note that this list contains only a list of resource IDs. The actual resources are configured in *PUCCH-Config*. |

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| **Conditional Presence** | **Explanation** |
| *PI2-BPSK* | The field is optionally present, Need R, if *format3* and/or *format4* are configured and *pi2BPSK* is configured in each of them. It is absent, Need R otherwise. |

 *NEXT CHANGES*

– *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

 ...,

 [[

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

 ul-dci-triggered-UL-ChannelAccess-CPext-CAPC-r16 SEQUENCE (SIZE (1..64)) OF INTEGER (0..63) OPTIONAL, -- Need M

 pusch-RepTypeIndicator SEQUENCE {

 pusch-RepTypeIndicatorForDCI-Format0-2-r16 ENUMERATED { pusch-RepTypeA, pusch-RepTypeB} OPTIONAL, -- Need M

 pusch-RepTypeIndicatorForDCI-Format0-1-r16 ENUMERATED { pusch-RepTypeA, pusch-RepTypeB} OPTIONAL -- Need M

 },

 configurableFieldForDCI-Format0-2 SEQUENCE {

 harq-ProcessNumberSizeForDCI-Format0-2-r16 INTEGER (0..4) OPTIONAL, -- Need M

 dmrs-SequenceInitializationForDCI-Format0-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 numberOfBitsForRV-ForDCI-Format0-2-r16 INTEGER (0..2) OPTIONAL, -- Need M

 antennaPortsFieldPresenceForDCI-Format0-2-r16 ENUMERATED (enabled) OPTIONAL, -- Need S

 ...

 },

 resourceAllocationType1GranularityForDCI-Format0-2-r16 ENUMERATED { n2,n4,n8,n16 } OPTIONAL, -- Need S

 frequencyHoppingForDCI-Format0-2-r16 CHOICE {

 pusch-RepTypeA ENUMERATED {intraSlot, interSlot},

 pusch-RepTypeB ENUMERATED {interRepetition, interSlot}

 } OPTIONAL, -- Need S

 frequencyHoppingOffsetListsForDCI-Format0-2-r16 SEQUENCE (SIZE (1..4)) OF INTEGER (1.. maxNrofPhysicalResourceBlocks-1)

 OPTIONAL, -- Need M

 uci-OnPUSCH-ForDCI-Format0-2-r16 SetupRelease { UCI-OnPUSCH-ForDCI-Format0-2-r16 } OPTIONAL, -- Need M

 uci-OnPUSCH-ListForDCI-Format0-2-r16 SEQUENCE (SIZE (1..2)) OF UCI-OnPUSCH-ForDCI-Format0-2-r16 OPTIONAL, -- Need M

 uci-OnPUSCH-ListForDCI-Format0-1-r16 SEQUENCE (SIZE (1..2)) OF UCI-OnPUSCH OPTIONAL, -- Need M

 pusch-TimeDomainAllocationListForDCI-Format0-2-r16 SetupRelease { PUSCH-TimeDomainResourceAllocationListNew-r16 }

 OPTIONAL, -- Need M

 pusch-TimeDomainAllocationListForDCI-Format0-1-r16 SetupRelease { PUSCH-TimeDomainResourceAllocationListNew-r16 }

 OPTIONAL, -- Need M

 maxRankForDCI-Format0-2-r16 INTEGER (1..4) OPTIONAL, -- Cond codebookBased

 codebookSubsetForDCI-Format0-2-r16 ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent,nonCoherent}

 OPTIONAL, -- Cond codebookBased

 dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2-r16 SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

 dmrs-UplinkForPUSCH-MappingTypeBForDCI-Format0-2-r16 SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

 mcs-TableForDCI-Format0-2-r16 ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 mcs-TableTransformPrecoderForDCI-Format0-2-r16 ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 resourceAllocationForDCI-Format0-2-r16 ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},

 priorityIndicator SEQUENCE {

 priorityIndicatorForDCI-Format0-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 priorityIndicatorForDCI-Format0-1-r16 ENUMERATED {enabled} OPTIONAL -- Need S

 } OPTIONAL, -- Need N

 invalidSymbolPatternIndicator SEQUENCE {

 invalidSymbolPatternIndicatorForDCI-Format0-1-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 invalidSymbolPatternIndicatorForDCI-Format0-2-r16 ENUMERATED {enabled} OPTIONAL -- Need S

 } OPTIONAL, -- Need N

 frequencyHoppingForDCI-Format0-1-r16 ENUMERATED {interRepetition, interSlot} OPTIONAL, -- Cond RepTypeB

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

 pusch-PowerControl-v16xy PUSCH-PowerControl-v16xy OPTIONAL, -- Need M

 ul-FullPowerTransmission-r16 ENUMERATED {fullpower, fullpowerMode1, fullpoweMode2} OPTIONAL -- Need R

 ]]

}

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)

UCI-OnPUSCH-ForDCI-Format0-2-r16 ::= SEQUENCE {

 betaOffsetsForDCI-Format0-2-r16 CHOICE {

 dynamicForDCI-Format0-2-r16 CHOICE {

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

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

 },

 semiStaticForDCI-Format0-2-r16 BetaOffsets

 } OPTIONAL, -- Need M

 scalingForDCI-Format0-2-r16 ENUMERATED { f0p5, f0p65, f0p8, f1 }

}

-- TAG-PUSCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***PUSCH-Config* field descriptions** |
| ***antennaPortsFieldPresenceForDCI-Format0-2***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). The parameter is used to enable 0 for "Antenna port(s)" in DCI format 0\_2 while one or more of *dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2* and *dmrs-UplinkForPUSCH-MappingTypeBForDCI-Format0-2* is configured to a UE. If none of *dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2* and *dmrs-UplinkForPUSCH-MappingTypeBForDCI-Format0-2* is configured to the UE, then the parameter *antennaPortsFieldPresenceForDCI-Format0-2* is not configured neither. |
| ***betaOffsetsForDCI-Format0-2***Configuration of beta-offset for DCI format 0\_2. If semiStaticForDCI-Format0-2 is chosen, the UE shall apply the value of 0 bit for the field of beta offset indicator in DCI format 0\_2. If dynamicForDCI-Format0-2 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). |
| ***codebookSubset, codebookSubsetForDCI-Format0-2***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* refers to DCI format 0\_1 and the field *codebookSubsetForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 6.1.1.1). |
| ***dataScramblingIdentityPUSCH***Identifier used to initalite 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-SequenceInitializationForDCI-Format0-2***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-MappingTypeAForDCI-Format0-2***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* refers to DCI format 0\_1 and the field *dmrs-UplinkForPUSCH-MappingTypeAFormat0-2* refers to DCI format 0\_2, respectively. If both *dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2* and *dmrs-UplinkForPUSCH-MappingTypeBForDCIFormat0-2* are absent, then 0 bit for "Antenna port(s)" in DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-UplinkForPUSCH-MappingTypeB, dmrs-UplinkForPUSCH-MappingTypeBForDCI-Format0-2***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* refers to DCI format 0\_1 and the field *dmrs-UplinkForPUSCH-MappingTypeBFormat0-2* refers to DCI format 0\_2, respectively. If both *dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2* and *dmrs-UplinkForPUSCH-MappingTypeBForDCIFormat0-2* are absent, then 0 bit for "Antenna port(s)" in DCI format 0\_2 (see 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 (see TS 38.214 [19], clause 6.3). The field *frequencyHopping* refers to DCI formats other than DCI format 0\_2 for 'pusch-RepTypeA'. |
| ***frequencyHoppingForDCI-Format0-1***Indicates the frequency hopping scheme for DCI format 0\_1 when *pusch-RepTypeIndicatorForDCI-Format0-1* 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 (see TS 38.214 [19], clause 6.1). |
| ***frequencyHoppingForDCI-Format0-2***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-RepTypeIndicatorForDCI-Format0-2* is set to '*pusch-RepTypeA*', the frequency hopping scheme can be chosen between 'intra-slot frequency hopping and 'inter-slot frequency hopping' if enabled. When *pusch-RepTypeIndicatorForDCI-Format0-2* 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, frequencyHoppingOffsetListsForDCI-Format0-2***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* refers to DCI format 0\_0 or DCI format 0\_1 and the field *frequencyHoppingOffsetListsForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 6.3). |
| ***harq-ProcessNumberSizeForDCI-Format0-2***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. If *invalidSymbolPattern* is configured and *invalidSymbolPatternIndicatorForDCI-Format0-2* is not configured, segmentation occurs around semi-static DL symbols and invalid symbols in the pattern, and the remaining symbols are used for PUSCH (see TS 38.214 [19] clause 6.1). |
| ***invalidSymbolPatternIndicatorForDCI-Format0-1, invalidSymbolPatternIndicatorForDCI-Format0-2***Indicates the presence of an additional bit in the DCI format 0\_1/0\_2 to indicate whether the pattern applies or not. If *invalidSymbolPattern* is not configured, then 0 bit for "Invalid Symbol Pattern Indicator" in DCI format 0\_1/0\_2. The field *invalidSymbolPatternIndicatorForDCI-Format0-1* refers to the DCI format 0\_1 and the field *invalidSymbolPatternIndicatorForDCI-Format0-1* refers to DCI format 0\_2 (see TS 38.214 [19] clause 6.1). |
| ***maxRank, maxRankForDCI-Format0-2***Subset of PMIs addressed by TRIs from 1 to ULmaxRank (see TS 38.214 [19], clause 6.1.1.1). The field *maxRank* refers to DCI format 0\_0 or DCI format 0\_1 and the field *maxRankForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 6.1.1.1). |
| ***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* refers to DCI format 0\_0 or DCI format 0\_1 and the field *mcs-TableForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 6.1.4.1). |
| ***mcs-TableTransformPrecoder, mcs-TableTransformPrecoderFormat0-2***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* refers to DCI format 0\_0 or DCI format 0\_1 and the field *mcs-TableTransformPrecoderForDCI-Format0-2* refers to DCI format 0\_2, respectively (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). |
| ***numberOfBitsRV-ForDCI-Format0-2***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). |
| ***priorityIndicatorForDCI-Format0-1, numberOfBitsRV-ForDCI-Format0-2***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 *priorityIndicatorForDCI-Format0-1* refers to DCI format 0\_1 and the field *priorityIndicatorForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13] clause 9).Editor's note: Please note that for now we only have agreement to use this 1-bit field in DCI when only DCI format 0\_1/1\_1 is configured or only DCI format 0\_2/1\_2 is configured in USS per BWP. Further update on the description here may be updated depending on further agreement on other cases. |
| ***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-RepTypeIndicatorForDCI-Format0-1, pusch-RepTypeIndicatorForDCI-Format0-2***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-RepTypeIndicatorForDCI-Format0-1* refers to DCI format 0\_1 and the field *pusch-RepTypeIndicatorForDCI-Format0-2* refers to DCI format 0\_2, respectively (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* refers to DCI formats 0\_0 or DCI format 0\_1 when the field *pusch-TimeDomainAllocationListForDCI-Format0-1* is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and table 6.1.2.1.1-1A). |
| ***pusch-TimeDomainAllocationListForDCI-Format0-1***Configuration of the time domain resource allocation (TDRA) table for DCI format 0\_1 (see TS 38.214 [19], clause 6.2.1, table 6.1.2.1.1-1A). |
| ***pusch-TimeDomainAllocationListForDCI-Format0-2***Configuration of the time domain resource allocation (TDRA) table for DCI format 0\_2 (see TS 38.214 [19], clause 6.2.1, table 6.1.2.1.1-1B). |
| ***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 (see TS 38.214 [19], clause 6.1.2.2.1). |
| ***resourceAllocation, resourceAllocationForDCI-Format0-2***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* refers to DCI format 0\_1 and the field *resourceAllocationForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 6.1.2). |
| ***resourceAllocationType1GranularityForDCI-Format0-2***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). |
| ***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*. |
| ***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-ListForDCI-Format0-1, uci-OnPUSCH-ListForDCI-Format0-2***Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0\_1/0\_2. The field uci-OnPUSCH-ListForDCI-Format0-1 refers to DCI format 0\_1 and the field uci-OnPUSCH-ListForDCI-Format0-2 refers to DCI format 0\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3).Editor's note: FFS on the definition for uci-OnPUSCH-ListForDCI-Format0-2. |
| ***ul-dci-triggered-UL-ChannelAccess-CPext-CAPC***List of the combinations of CP extension and UL channel access mode (See TS 38.212 [17], Table 7.3.1-2-35). |
| ***ul-FullPowerTransmission***Configures the UE with UL full power transmission mode as specified in TS 38.213. |

|  |
| --- |
| ***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-ForDCI-Format0-2 field descriptions*** |
| ***betaOffsetsForDCI-Format0-2***Selection between and configuration of dynamic and semi-static beta-offset for DCI Format 0\_2. If the field is not configured, the UE applies the value 'semiStatic' (see TS 38.213 [13], clause 9.3). |
| ***dynamicForDCI-Format0-2***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). |
| ***semiStaticForDCI-Format0-2***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). |
| ***scalingForDCI-Format0-2***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).Editor's note: Whether the scaling is shared or separate for DCI format 0\_1 and DCI format 0\_2.Editor's note: Whether and how to apply the scaling for PUSCH with configured grant. |

|  |  |
| --- | --- |
| **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-RepTypeIndicatorForDCI-Format0-1* is set to pusch-RepTypeB. It is absent otherwise. |

 *NEXT CHANGES*

– *PUSCH-PowerControl*

The IE *PUSCH-PowerControl* is used to configure UE specific power control parameter for PUSCH.

***PUSCH-PowerControl* information element**

-- ASN1START

-- TAG-PUSCH-POWERCONTROL-START

PUSCH-PowerControl ::= SEQUENCE {

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

 msg3-Alpha Alpha OPTIONAL, -- Need S

 p0-NominalWithoutGrant INTEGER (-202..24) OPTIONAL, -- Need M

 p0-AlphaSets SEQUENCE (SIZE (1..maxNrofP0-PUSCH-AlphaSets)) OF P0-PUSCH-AlphaSet OPTIONAL, -- Need M

 pathlossReferenceRSToAddModList SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs)) OF PUSCH-PathlossReferenceRS

 OPTIONAL, -- Need N

 pathlossReferenceRSToReleaseList SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs)) OF PUSCH-PathlossReferenceRS-Id

 OPTIONAL, -- Need N

 twoPUSCH-PC-AdjustmentStates ENUMERATED {twoStates} OPTIONAL, -- Need S

 deltaMCS ENUMERATED {enabled} OPTIONAL, -- Need S

 sri-PUSCH-MappingToAddModList SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControl

 OPTIONAL, -- Need N

 sri-PUSCH-MappingToReleaseList SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControlId

 OPTIONAL -- Need N

}

P0-PUSCH-AlphaSet ::= SEQUENCE {

 p0-PUSCH-AlphaSetId P0-PUSCH-AlphaSetId,

 p0 INTEGER (-16..15) OPTIONAL, -- Need S

 alpha Alpha OPTIONAL -- Need S

}

P0-PUSCH-AlphaSetId ::= INTEGER (0..maxNrofP0-PUSCH-AlphaSets-1)

PUSCH-PathlossReferenceRS ::= SEQUENCE {

 pusch-PathlossReferenceRS-Id PUSCH-PathlossReferenceRS-Id,

 referenceSignal CHOICE {

 ssb-Index SSB-Index,

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

 }

}

PUSCH-PathlossReferenceRS-r16 ::= SEQUENCE {

 pusch-PathlossReferenceRS-Id-r16 PUSCH-PathlossReferenceRS-Id-r16,

 referenceSignal-r16 CHOICE {

 ssb-Index-r16 SSB-Index,

 csi-RS-Index-r16 NZP-CSI-RS-ResourceId

 }

}

PUSCH-PathlossReferenceRS-Id ::= INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1)

PUSCH-PathlossReferenceRS-Id-r16 ::= INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1-r16)

SRI-PUSCH-PowerControl ::= SEQUENCE {

 sri-PUSCH-PowerControlId SRI-PUSCH-PowerControlId,

 sri-PUSCH-PathlossReferenceRS-Id PUSCH-PathlossReferenceRS-Id,

 sri-P0-PUSCH-AlphaSetId P0-PUSCH-AlphaSetId,

 sri-PUSCH-ClosedLoopIndex ENUMERATED { i0, i1 }

}

SRI-PUSCH-PowerControlId ::= INTEGER (0..maxNrofSRI-PUSCH-Mappings-1)

PUSCH-PowerControl-v16xy ::= SEQUENCE {

 pathlossReferenceRSToAddModList-r16 SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs-r16)) OF PUSCH-PathlossReferenceRS-r16

 OPTIONAL, -- Need N

 pathlossReferenceRSToReleaseList-r16 SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs-r16)) OF PUSCH-PathlossReferenceRS-Id-r16

 OPTIONAL, -- Need N

 p0-PUSCH-SetList-r16 SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF P0-PUSCH-Set-r16 OPTIONAL, -- Need R

 olpc-ParameterSet SEQUENCE {

 olpc-ParameterSetForDCI-Format0-1-r16 INTEGER (1..2) OPTIONAL, -- Need M

 olpc-ParameterSetForDCI-Format0-2-r16 INTEGER (1..2) OPTIONAL -- Need M

 } OPTIONAL, -- Need M

 ...

}

P0-PUSCH-Set-r16 ::= SEQUENCE {

 p0-PUSCH-SetId-r16 P0-PUSCH-SetId-r16,

 p0-List-r16 SEQUENCE (SIZE (1..maxNrofP0-PUSCH-Set-r16)) OF P0-PUSCH-r16 OPTIONAL, -- Need R

 ...

}

P0-PUSCH-SetId-r16 ::= INTEGER (0..maxNrofSRI-PUSCH-Mappings-1)

P0-PUSCH-r16 ::= INTEGER (-16..15)

-- TAG-PUSCH-POWERCONTROL-STOP

-- ASN1STOP

|  |
| --- |
| ***P0-PUSCH-AlphaSet* field descriptions** |
| ***alpha***alpha value for PUSCH with grant (except msg3) (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 1. |
| ***p0***P0 value for PUSCH with grant (except msg3) in steps of 1dB (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 0. |

|  |
| --- |
| ***P0-PUSCH-Set* field descriptions** |
| ***p0-List***Configuration of {p0-PUSCH, p0-PUSCH} sets for PUSCH. If SRI is present in the DCI, then one p0-PUSCH can be configured in P0-PUSCH-Set. If SRI is not present in the DCI, and both *OLPCParameterSet-ForDCIFormat0\_1* and *OLPCParameterSet-ForDCIFormat0\_2* are configured to be 1 bit, then one p0-PUSCH can be configured in P0-PUSCH-Set. If SRI is not present in the DCI, and if any of *OLPCParameterSet-ForDCIFormat0\_1* and *OLPCParameterSet-ForDCIFormat0\_2* is configured to be 2 bits, then two p0-PUSCH values can be configured in P0-PUSCH-Set (see TS 38.213 [13] clause 7 and TS 38.212 [17] clause 7.3.1). |
| ***p0-PUSCH-SetId***Configure the index of a p0-PUSCH-Set (see TS 38.213 [13] clause 7 and TS 38.212 [17] clause 7.3.1). |

|  |
| --- |
| ***PUSCH-PowerControl* field descriptions** |
| ***deltaMCS***Indicates whether to apply delta MCS. When the field is absent, the UE applies Ks = 0 in delta\_TFC formula for PUSCH (see TS 38.213 [13], clause 7.1). |
| ***msg3-Alpha***Dedicated alpha value for msg3 PUSCH (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 1. |
| ***olpc-ParameterSetForDCI-Format0-1, olpc-ParameterSetForDCI-Format0-2***Configures the number of bits for Open-loop power control parameter set indication for DCI format 0\_1/0\_2 in case SRI is not configured in the DCI. 2 bits is applicable only if SRI is not present in the DCI format 0\_1. The field *olpc-ParameterSetForDCI-Format0-1* refers to DCI format 0\_1 and the field *olpc-ParameterSetForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11). |
| ***p0-AlphaSets***configuration {p0-pusch, alpha} sets for PUSCH (except msg3), i.e., { {p0,alpha,index1}, {p0,alpha,index2},...} (see TS 38.213 [13], clause 7.1). When no set is configured, the UE uses the P0-nominal for msg3 PUSCH, P0-UE is set to 0 and alpha is set according to msg3-Alpha configured for msg3 PUSCH. |
| ***p0-NominalWithoutGrant***P0 value for UL grant-free/SPS based PUSCH. Value in dBm. Only even values (step size 2) allowed (see TS 38.213 [13], clause 7.1). |
| ***p0-PUSCH-SetList***Configure one additional *P0-PUSCH-Set* per SRI. If present, the one bit or 2 bits in the DCI is used to dynamically indicate among the P0 value from the existing *P0-PUSCH-AlphaSet* and the P0 value(s) from the *P0-PUSCH-Set* (See TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 17). |
| ***pathlossReferenceRSToAddModList***A set of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for PUSCH path loss estimation. Up to *maxNrofPUSCH-PathlossReferenceRSs* may be configured (see TS 38.213 [13], clause 7.1). |
| ***sri-PUSCH-MappingToAddModList***A list of *SRI-PUSCH-PowerControl* elements among which one is selected by the SRI field in DCI (see TS 38.213 [13], clause 7.1). |
| ***tpc-Accumulation***If enabled, UE applies TPC commands via accumulation. If not enabled, UE applies the TPC command without accumulation. If the field is absent, TPC accumulation is enabled (see TS 38.213 [13], clause 7.1). |
| ***twoPUSCH-PC-AdjustmentStates***Number of PUSCH power control adjustment states maintained by the UE (i.e., fc(i)). If the field is present (*n2*) the UE maintains two power control states (i.e., fc(i,0) and fc(i,1)). If the field is absent, it maintains one power control state (i.e., fc(i,0)) (see TS 38.213 [13], clause 7.1). |

|  |
| --- |
| ***SRI-PUSCH-PowerControl* field descriptions** |
| ***sri-P0-PUSCH-AlphaSetId***The ID of a *P0-PUSCH-AlphaSet* as configured in *p0-AlphaSets* *in PUSCH-PowerControl*. |
| ***sri-PUSCH-ClosedLoopIndex***The index of the closed power control loop associated with this *SRI-PUSCH-PowerControl.* |
| ***sri-PUSCH-PathlossReferenceRS-Id***The ID of *PUSCH-PathlossReferenceRS* as configured in the *pathlossReferenceRSToAddModList* in *PUSCH-PowerControl*. |
| ***sri-PUSCH-PowerControlId***The ID of this *SRI-PUSCH-PowerControl* configuration. It is used as the codepoint (payload) in the SRI DCI field. |

 *NEXT CHANGES*

– *PUSCH-TimeDomainResourceAllocationListNew*

The IE *PUSCH-TimeDomainResourceAllocationListNew* is used to configure a time domain relation between PDCCH and PUSCH for DCI format 0-1/0-2. *PUSCH-TimeDomainResourceAllocationListNew* contains one or more of such *PUSCH-TimeDomainResourceAllocationNew*. The network indicates in the UL grant which of the configured time domain allocations the UE shall apply for that UL grant. The UE determines the bit width of the DCI field based on the number of entries in the *PUSCH-TimeDomainResourceAllocationListNew*. Value 0 in the DCI field refers to the first element in this list, value 1 in the DCI field refers to the second element in this list, and so on.

***PUSCH-TimeDomainResourceAllocationNew* information element**

-- ASN1START

-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLISTNEW-START

PUSCH-TimeDomainResourceAllocationListNew-r16 ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocationNew-r16

PUSCH-TimeDomainResourceAllocationNew-r16 ::= SEQUENCE {

 k2-r16 INTEGER (0..32) OPTIONAL, -- Need S

 mappingType-r16 ENUMERATED {typeA, typeB} OPTIONAL, -- Cond RepTypeA

 startSymbolAndLength-r16 INTEGER (0..127) OPTIONAL, -- Cond RepTypeA

 startSymbol-r16 INTEGER (0..13) OPTIONAL, -- Cond RepTypeB

 length-r16 INTEGER (1..14) OPTIONAL, -- Cond RepTypeB

 numberOfRepetitions-r16 ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16},

 ...

}

-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLISTNEW-STOP

-- ASN1STOP

|  |
| --- |
| ***PUSCH-TimeDomainResourceAllocationListNew* field descriptions** |
| ***k2***Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1) for DCI format 0\_1/0\_2. When the field is absent the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, and the value 3 when PUSCH SCS is 120KHz. |
| ***length***Indicates the length allocated for PUSCH for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***mappingType***Mapping type for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***numberOfRepetitions***Configure the number of repetitions for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***startSymbol***Indicates the index of start symbol for PUSCH for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***startSymbolAndLength***An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV) for DCI format 0\_1/0\_2. The network configures the field so that the allocation does not cross the slot boundary (see TS 38.214 [19], clause 6.1.2.1). |

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| --- | --- |
| **Conditional Presence** | **Explanation** |
| *RepTypeA* | The field is optionally present if the corresponding *pusch-RepTypeIndicatorForDCI-Format0-1* or *pusch-RepTypeIndicatorForDCI-Format0-2* is set to pusch-RepTypeA, Need R. It is absent otherwise. |
| *RepTypeB* | The field is optionally present if *pusch-RepTypeIndicatorForDCI-Format0-1* or *pusch-RepTypeIndicatorForDCI-Format0-2* is set to pusch-RepTypeB, Need R. It is absent otherwise. |

 *NEXT CHANGES*

– *RLC-Config*

The IE *RLC-Config* is used to specify the RLC configuration of SRBs and DRBs.

***RLC-Config* information element**

-- ASN1START

-- TAG-RLC-CONFIG-START

RLC-Config ::= CHOICE {

 am SEQUENCE {

 ul-AM-RLC UL-AM-RLC,

 dl-AM-RLC DL-AM-RLC

 },

 um-Bi-Directional SEQUENCE {

 ul-UM-RLC UL-UM-RLC,

 dl-UM-RLC DL-UM-RLC

 },

 um-Uni-Directional-UL SEQUENCE {

 ul-UM-RLC UL-UM-RLC

 },

 um-Uni-Directional-DL SEQUENCE {

 dl-UM-RLC DL-UM-RLC

 },

 ...

}

UL-AM-RLC ::= SEQUENCE {

 sn-FieldLength SN-FieldLengthAM OPTIONAL, -- Cond Reestab

 t-PollRetransmit T-PollRetransmit,

 pollPDU PollPDU,

 pollByte PollByte,

 maxRetxThreshold ENUMERATED { t1, t2, t3, t4, t6, t8, t16, t32 }

}

DL-AM-RLC ::= SEQUENCE {

 sn-FieldLength SN-FieldLengthAM OPTIONAL, -- Cond Reestab

 t-Reassembly T-Reassembly,

 t-StatusProhibit T-StatusProhibit

}

UL-UM-RLC ::= SEQUENCE {

 sn-FieldLength SN-FieldLengthUM OPTIONAL -- Cond Reestab

}

DL-UM-RLC ::= SEQUENCE {

 sn-FieldLength SN-FieldLengthUM OPTIONAL, -- Cond Reestab

 t-Reassembly T-Reassembly

}

T-PollRetransmit ::= ENUMERATED {

 ms5, ms10, ms15, ms20, ms25, ms30, ms35,

 ms40, ms45, ms50, ms55, ms60, ms65, ms70,

 ms75, ms80, ms85, ms90, ms95, ms100, ms105,

 ms110, ms115, ms120, ms125, ms130, ms135,

 ms140, ms145, ms150, ms155, ms160, ms165,

 ms170, ms175, ms180, ms185, ms190, ms195,

 ms200, ms205, ms210, ms215, ms220, ms225,

 ms230, ms235, ms240, ms245, ms250, ms300,

 ms350, ms400, ms450, ms500, ms800, ms1000,

 ms2000, ms4000, ms1-v16xy, ms2-v16xy, ms3-v16xy,

 ms4-v16xy, spare1}

PollPDU ::= ENUMERATED {

 p4, p8, p16, p32, p64, p128, p256, p512, p1024, p2048, p4096, p6144, p8192, p12288, p16384,p20480,

 p24576, p28672, p32768, p40960, p49152, p57344, p65536, infinity, spare8, spare7, spare6, spare5, spare4,

 spare3, spare2, spare1}

PollByte ::= ENUMERATED {

 kB1, kB2, kB5, kB8, kB10, kB15, kB25, kB50, kB75,

 kB100, kB125, kB250, kB375, kB500, kB750, kB1000,

 kB1250, kB1500, kB2000, kB3000, kB4000, kB4500,

 kB5000, kB5500, kB6000, kB6500, kB7000, kB7500,

 mB8, mB9, mB10, mB11, mB12, mB13, mB14, mB15,

 mB16, mB17, mB18, mB20, mB25, mB30, mB40, infinity,

 spare20, spare19, spare18, spare17, spare16,

 spare15, spare14, spare13, spare12, spare11,

 spare10, spare9, spare8, spare7, spare6, spare5,

 spare4, spare3, spare2, spare1}

T-Reassembly ::= ENUMERATED {

 ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,

 ms40, ms45, ms50, ms55, ms60, ms65, ms70,

 ms75, ms80, ms85, ms90, ms95, ms100, ms110,

 ms120, ms130, ms140, ms150, ms160, ms170,

 ms180, ms190, ms200, spare1}

T-StatusProhibit ::= ENUMERATED {

 ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,

 ms40, ms45, ms50, ms55, ms60, ms65, ms70,

 ms75, ms80, ms85, ms90, ms95, ms100, ms105,

 ms110, ms115, ms120, ms125, ms130, ms135,

 ms140, ms145, ms150, ms155, ms160, ms165,

 ms170, ms175, ms180, ms185, ms190, ms195,

 ms200, ms205, ms210, ms215, ms220, ms225,

 ms230, ms235, ms240, ms245, ms250, ms300,

 ms350, ms400, ms450, ms500, ms800, ms1000,

 ms1200, ms1600, ms2000, ms2400, spare2, spare1}

SN-FieldLengthUM ::= ENUMERATED {size6, size12}

SN-FieldLengthAM ::= ENUMERATED {size12, size18}

DL-AM-RLC-v16xy ::= SEQUENCE {

 t-StatusProhibit-v16xy T-StatusProhibit-v16xy OPTIONAL -- Need R

}

T-StatusProhibit-v16xy ::= ENUMERATED { ms1, ms2, ms3, ms4, spare4, spare3, spare2, spare1}

-- TAG-RLC-CONFIG-STOP

-- ASN1STOP

| ***RLC-Config* field descriptions** |
| --- |
| ***maxRetxThreshold***Parameter for RLC AM in TS 38.322 [4]. Value *t1* corresponds to 1 retransmission, value *t2* corresponds to 2 retransmissions and so on. |
| ***pollByte***Parameter for RLC AM in TS 38.322 [4]. Value *kB25* corresponds to 25 kBytes, value *kB50* corresponds to 50 kBytes and so on. *infinity* corresponds to an infinite amount of kBytes. |
| ***pollPDU***Parameter for RLC AM in TS 38.322 [4]. Value *p4* corresponds to 4 PDUs, value *p8* corresponds to 8 PDUs and so on. *infinity* corresponds to an infinite number of PDUs. |
| ***sn-FieldLength***Indicates the RLC SN field size, see TS 38.322 [4], in bits. Value *size6* means 6 bits, value *size12* means 12 bits, value *size18* means 18 bits. The value of *sn-FieldLength* for a DRB shall be changed only using reconfiguration with sync. The network configures only value *size12* in *SN-FieldLengthAM* for SRB. |
| ***t-PollRetransmit***Timer for RLC AM in TS 38.322 [4], in milliseconds. Value *ms5* means 5 ms, value *ms10* means 10 ms and so on. |
| ***t-Reassembly***Timer for reassembly in TS 38.322 [4], in milliseconds. Value *ms0* means 0 ms, value *ms5* means 5 ms and so on.  |
| ***t-StatusProhibit***Timer for status reporting in TS 38.322 [4], in milliseconds. Value *ms0* means 0 ms, value *ms5* means 5 ms and so on. If *t-StatusProhibit-v16xy* is present, the UE shall ignore *t-StatusProhibit* (without suffix). |
|  |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Reestab* | The field is mandatory present at bearer setup. It is optionally present, need M, at RLC re-establishment. Otherwise it is absent. Need M. |

 *NEXT CHANGES*

– *SchedulingRequestResourceConfig*

The IE *SchedulingRequestResourceConfig* determines physical layer resources on PUCCH where the UE may send the dedicated scheduling request (D-SR) (see TS 38.213 [13], clause 9.2.4).

***SchedulingRequestResourceConfig* information element**

-- ASN1START

-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-START

SchedulingRequestResourceConfig ::= SEQUENCE {

 schedulingRequestResourceId SchedulingRequestResourceId,

 schedulingRequestID SchedulingRequestId,

 periodicityAndOffset CHOICE {

 sym2 NULL,

 sym6or7 NULL,

 sl1 NULL, -- Recurs in every slot

 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),

 sl40 INTEGER (0..39),

 sl80 INTEGER (0..79),

 sl160 INTEGER (0..159),

 sl320 INTEGER (0..319),

 sl640 INTEGER (0..639)

 } OPTIONAL, -- Need M

 resource PUCCH-ResourceId OPTIONAL -- Need M

}

SchedulingRequestResourceConfig-v16xy ::= SEQUENCE {

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

 ...

}

-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SchedulingRequestResourceConfig* field descriptions** |
| ***periodicityAndOffset***SR periodicity and offset in number of symbols or slots (see TS 38.213 [13], clause 9.2.4) The following periodicities may be configured depending on the chosen subcarrier spacing:SCS = 15 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 5sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80slSCS = 30 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl, 160slSCS = 60 kHz: 2sym, 7sym/6sym, 1sl, 2sl, 4sl, 8sl, 16sl, 20sl, 40sl, 80sl, 160sl, 320slSCS = 120 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640slsym6or7 corresponds to 6 symbols if extended cyclic prefix and a SCS of 60 kHz are configured, otherwise it corresponds to 7 symbols.For periodicities 2sym, 7sym and sl1 the UE assumes an offset of 0 slots. |
| ***phy-PriorityIndex***Indicates whether this scheduling request resource is *high* or *low* priority in PHY prioritization/multiplexing handling (see TS 38.213 [13], clause 9.2.4). Value *p0* indicates low priority and value *p1* indicates high priority. |
| ***resource***ID of the PUCCH resource in which the UE shall send the scheduling request. The actual *PUCCH-Resource* is configured in *PUCCH-Config* of the same UL BWP and serving cell as this *SchedulingRequestResourceConfig*. The network configures a *PUCCH-Resource* of *PUCCH-format0* or *PUCCH-format1* (other formats not supported) (see TS 38.213 [13], clause 9.2.4) |
| ***schedulingRequestID***The ID of the *SchedulingRequestConfig* that uses this scheduling request resource. |

 *NEXT CHANGES*

– *SearchSpace*

The IE *SearchSpace* defines how/where to search for PDCCH candidates. Each search space is associated with one *ControlResourceSet*. For a scheduled cell in the case of cross carrier scheduling, except for *nrofCandidates*, all the optional fields are absent.

***SearchSpace* information element**

-- ASN1START

-- TAG-SEARCHSPACE-START

SearchSpace ::= SEQUENCE {

 searchSpaceId SearchSpaceId,

 controlResourceSetId ControlResourceSetId OPTIONAL, -- Cond SetupOnly

 monitoringSlotPeriodicityAndOffset 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),

 sl40 INTEGER (0..39),

 sl80 INTEGER (0..79),

 sl160 INTEGER (0..159),

 sl320 INTEGER (0..319),

 sl640 INTEGER (0..639),

 sl1280 INTEGER (0..1279),

 sl2560 INTEGER (0..2559)

 } OPTIONAL, -- Cond Setup

 duration INTEGER (2..2559) OPTIONAL, -- Need R

 monitoringSymbolsWithinSlot BIT STRING (SIZE (14)) OPTIONAL, -- Cond Setup

 nrofCandidates SEQUENCE {

 aggregationLevel1 ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},

 aggregationLevel2 ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},

 aggregationLevel4 ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},

 aggregationLevel8 ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},

 aggregationLevel16 ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8}

 } OPTIONAL, -- Cond Setup

 searchSpaceType CHOICE {

 common SEQUENCE {

 dci-Format0-0-AndFormat1-0 SEQUENCE {

 ...

 } OPTIONAL, -- Need R

 dci-Format2-0 SEQUENCE {

 nrofCandidates-SFI SEQUENCE {

 aggregationLevel1 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel2 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel4 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel8 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel16 ENUMERATED {n1, n2} OPTIONAL -- Need R

 },

 ...

 } OPTIONAL, -- Need R

 dci-Format2-1 SEQUENCE {

 ...

 } OPTIONAL, -- Need R

 dci-Format2-2 SEQUENCE {

 ...

 } OPTIONAL, -- Need R

 dci-Format2-3 SEQUENCE {

 dummy1 ENUMERATED {sl1, sl2, sl4, sl5, sl8, sl10, sl16, sl20} OPTIONAL, -- Cond Setup

 dummy2 ENUMERATED {n1, n2},

 ...

 } OPTIONAL -- Need R

 },

 ue-Specific SEQUENCE {

 dci-Formats ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1},

 ...,

 [[

 dci-FormatsSL-r16 ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1, formats3-0, formats3-1,

 formats3-0-And-3-1} OPTIONAL, -- Need R

 dci-FormatsExt-r16 ENUMERATED {formats0-2-And-1-2, formats0-1-And-1-1And-0-2-And-1-2}

 OPTIONAL, -- Need R

 searchSpaceGroupIdList-r16 SEQUENCE (SIZE (1.. 2)) OF INTEGER (0..1) OPTIONAL, -- Need R

 freqMonitorLocations-r16 BIT STRING (SIZE (5)) OPTIONAL -- Need R

 ]]

 }

 } OPTIONAL -- Cond Setup2

}

SearchSpace-v16xy ::= SEQUENCE {

 searchSpaceId SearchSpaceId,

 controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL, -- Cond SetupOnly

 searchSpaceType-r16 CHOICE {

 common-r16 SEQUENCE {

 dci-Format2-4-r16 SEQUENCE {

 nrofCandidates-CI-r16 SEQUENCE {

 aggregationLevel1 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel2 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel4 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel8 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel16 ENUMERATED {n1, n2} OPTIONAL -- Need R

 },

 ...

 },

 dci-Format2-5-v16xy SEQUENCE {

 nrofCandidates-IAB-r16 SEQUENCE {

 aggregationLevel1-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel2-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel4-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel8-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

 aggregationLevel16-r16 ENUMERATED {n1, n2} OPTIONAL -- Need R

 },

 ...

 },

 dci-Format2-6-r16 SEQUENCE {

 ...

 } OPTIONAL, -- Need R

 ...

 },

 mt-Specific-v16xy SEQUENCE {

 dci-Formats-r16 ENUMERATED {formats2-0-And-2-5},

 ...

 }

 } OPTIONAL -- Cond Setup2

}

-- TAG-SEARCHSPACE-STOP

-- ASN1STOP

|  |
| --- |
| ***SearchSpace* field descriptions** |
| ***common***Configures this search space as common search space (CSS) and DCI formats to monitor. |
| ***controlResourceSetId***The CORESET applicable for this SearchSpace. Value 0 identifies the common CORESET#0 configured in MIB and in *ServingCellConfigCommon*. Values 1..*maxNrofControlResourceSets-1* identify CORESETs configured in System Information or by dedicated signalling. The CORESETs with *non-zero controlResourceSetId* are configured in the same BWP as this *SearchSpace*. If the field *controlResourceSetId-r16* is present, UE shall ignore the *controlResourceSetId* (without suffix). |
| ***dummy1, dummy2***This field is not used in the specification. If received it shall be ignored by the UE. |
| ***dci-Format0-0-AndFormat1-0***If configured, the UE monitors the DCI formats 0\_0 and 1\_0 according to TS 38.213 [13], clause 10.1. |
| ***dci-Format2-0***If configured, UE monitors the DCI format 2\_0 according to TS 38.213 [13], clause 10.1, 11.1.1. |
| ***dci-Format2-1***If configured, UE monitors the DCI format 2\_1 according to TS 38.213 [13], clause 10.1, 11.2. |
| ***dci-Format2-2***If configured, UE monitors the DCI format 2\_2 according to TS 38.213 [13], clause 10.1, 11.3. |
| ***dci-Format2-3***If configured, UE monitors the DCI format 2\_3 according to TS 38.213 [13], clause 10.1, 11.4 |
| ***dci-Format2-4***If configured, UE monitors the DCI format 2\_4 according to TS 38.213 [13], clause 11.5.  |
| ***dci-Format2-5***If configured, IAB-MT monitors the DCI format 2\_5 according to TS 38.213 [13], clause 14. |
| ***dci-Format2-6***If configured, UE monitors the DCI format 2\_6 according to TS 38.213 [13], clause 10.1, 11.5. DCI format 2\_6 can only be configured on the SpCell. |
| ***dci-Formats***Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1. |
| ***dci-FormatsExt***If this field is present, the field *dci-Formats* is ignored and *dci-FormatsExt* is used instead to indicate whether the UE monitors in this USS for DCI format 0\_2 and 1\_2 or formats 0\_1 and 1\_1 and 0\_2 and 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 10.1).  |
| ***dci-FormatsSL***Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1 or for format 3-0 of dynamic grant or for format 3-1 or for formats 3-0 of dynamic grant and 3-1. |
| ***duration***Number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the UE applies the value 1 slot, except for DCI format 2\_0. The UE ignores this field for DCI format 2\_0. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*).For IAB-MT, duration indicates number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the IAB-MT applies the value 1 slot, except for DCI format 2\_0 and DCI format 2\_5. The UE ignores this field for DCI format 2\_0 and DCI format 2\_5. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*). |
| ***freqMonitorLocations***1 implies a frequency domain resource allocation replicated from the pattern configured in the associated CORESET is mapped to the RB set. LSB corresponds to lowest RB set in the BWP. For a RB set indicated in the bitmap, the first PRB of the frequency domain monitoring location confined within the RB set is aligned with {the first PRB of the RB set + *rb-Offset* provided by the associated CORESET. |
| ***monitoringSlotPeriodicityAndOffset***Slots for PDCCH Monitoring configured as periodicity and offset. If the UE is configured to monitor DCI format 2\_1, only the values 'sl1', 'sl2' or 'sl4' are applicable. If the UE is configured to monitor DCI format 2\_0, only the values ′sl1′, ′sl2′, ′sl4′, ′sl5′, ′sl8′, ′sl10′, ′sl16′, and ′sl20′ are applicable (see TS 38.213 [13], clause 10). For IAB-MT, If the IAB-MT is configured to monitor DCI format 2\_1, only the values 'sl1', 'sl2' or 'sl4' are applicable. If the IAB-MT is configured to monitor DCI format 2\_0 or DCI format 2\_5, only the values ′sl1′, ′sl2′, ′sl4′, ′sl5′, ′sl8′, ′sl10′, ′sl16′, and ′sl20′ are applicable (see TS 38.213, clause 10). If the UE is configured to monitor DCI format 2\_4, the maximum monitoring periodicity for DCI format 2\_4 is 10 slots. |
| ***monitoringSymbolsWithinSlot***The first symbol(s) for PDCCH monitoring in the slots configured for PDCCH monitoring (see *monitoringSlotPeriodicityAndOffset* and *duration*). The most significant (left) bit represents the first OFDM in a slot, and the second most significant (left) bit represents the second OFDM symbol in a slot and so on. The bit(s) set to one identify the first OFDM symbol(s) of the control resource set within a slot. If the cyclic prefix of the BWP is set to extended CP, the last two bits within the bit string shall be ignored by the UE .For DCI format 2\_0, the first one symbol applies if the *duration* of CORESET (in the IE *ControlResourceSet*) identified by *controlResourceSetId* indicates 3 symbols, the first two symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 2 symbols, and the first three symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 1 symbol.See TS 38.213 [13], clause 10. |
| ***nrofCandidates-CI***The number of PDCCH candidates specifically for format 2-4 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 10.1). |
| ***nrofCandidates-SFI***The number of PDCCH candidates specifically for format 2-0 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 11.1.1). |
| ***nrofCandidates***Number of PDCCH candidates per aggregation level. The number of candidates and aggregation levels configured here applies to all formats unless a particular value is specified or a format-specific value is provided (see inside *searchSpaceType*). If configured in the *SearchSpace* of a cross carrier scheduled cell, this field determines the number of candidates and aggregation levels to be used on the linked scheduling cell (see TS 38.213 [13], clause 10). |
| ***searchSpaceGroupIdList***List of search space group IDs which the search space set is associated with. |
| ***searchSpaceId***Identity of the search space. SearchSpaceId = 0 identifies the *searchSpaceZero* configured via PBCH (MIB) or *ServingCellConfigCommon* and may hence not be used in the *SearchSpace* IE. The *searchSpaceId* is unique among the BWPs of a Serving Cell. In case of cross carrier scheduling, search spaces with the same *searchSpaceId* in scheduled cell and scheduling cell are linked to each other. The UE applies the search space for the scheduled cell only if the DL BWPs in which the linked search spaces are configured in scheduling cell and scheduled cell are both active.For an IAB-MT, the search space defines how/where to search for PDCCH candidates for an IAB-MT. Each search space is associated with one ControlResearchSet. For a scheduled cell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent. |
| ***searchSpaceType***Indicates whether this is a common search space (present) or a UE specific search space as well as DCI formats to monitor for. |
| ***ue-Specific***Configures this search space as UE specific search space (USS). The UE monitors the DCI format with CRC scrambled by C-RNTI, CS-RNTI (if configured), and SP-CSI-RNTI (if configured) |
| ***mt-Specific-v16xy***Configure this search space as IAB-MT specific search space (MSS). |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Setup* | This field is mandatory present upon creation of a new *SearchSpace*. It is optionally present, Need M, otherwise. |
| *Setup2* | Either of searchSpaceType (without suffix) or searchSpaceType-r16 field is mandatory present upon creation of a new SearchSpace. The fields are optionally present, Need M, otherwise. |
| *SetupOnly* | This field is mandatory present upon creation of a new *SearchSpace*. It is absent, Need M, otherwise. |

 *NEXT CHANGES*

– *UplinkCancellation*

The IE *UplinkCancellation* is used to configure the UE to monitor PDCCH for the CI-RNTI.

***UplinkCancellation* information element**

-- ASN1START

-- TAG-UPLINKCANCELLATION-START

UplinkCancellation-r16 ::= SEQUENCE {

 ci-RNTI-r16 RNTI-Value,

 dci-PayloadSizeForCI-r16 INTEGER (0..maxCI-DCI-PayloadSize-r16),

 ci-ConfigurationPerServingCell-r16 SEQUENCE (SIZE (1..maxNrofServingCells)) OF CI-ConfigurationPerServingCell-r16,

 ...

}

CI-ConfigurationPerServingCell-r16 ::= SEQUENCE {

 servingCellId ServCellIndex,

 positionInDCI-r16 INTEGER (0..maxCI-DCI-PayloadSize-r16-1),

 positionInDCI-ForSUL-r16 INTEGER (0..maxCI-DCI-PayloadSize-r16-1) OPTIONAL, -- Cond SUL-Only

 ci-PayloadSize-r16 ENUMERATED {n1, n2, n4, n5, n7, n8, n10, n14, n16, n20, n28, n32, n35, n42, n56, n112},

 timeFrequencyRegion-r16 SEQUENCE {

 timeDurationForCI-r16 ENUMERATED {n2, n4, n7, n14} OPTIONAL, -- Cond SymbolPeriodicity

 timeGranularityForCI-r16 ENUMERATED {n1, n2, n4, n7, n14, n28},

 frequencyRegionForCI-r16 INTEGER (0..37949),

 deltaOffset-r16 INTEGER (0..2),

 ...

 }

}

-- TAG-UPLINKCANCELLATION-STOP

-- ASN1STOP

|  |
| --- |
| ***UplinkCancellation* field descriptions** |
| ***ci-ConfigurationPerServingCell***Indicates (per serving cell) the position of the *ci-PaylaodSize* bit CI values inside the DCI payload (see TS 38.213 [13], clause 11.5). |
| ***ci-RNTI***RNTI used for indication cancellation in UL (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13], clause 11.5). |
| ***dci-PayloadSizeForCI***Total length of the DCI payload scrambled with CI-RNTI (see TS 38.213 [13], clause 11.5). |

|  |
| --- |
| ***CI-ConfigurationPerServingCell* field descriptions** |
| ***ci-PayloadSize***Configures the field size for each UL cancelation indicator of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.5).  |
| ***deltaOffset*** Configure the additional offset from the end of a PDCCH reception where the UE detects the DCI format 2\_4 and the first symbol of the T\_"CI" symbols, in the unit of OFDM symbol (see TS 38.213 [13], clause 11.2A).  |
| ***frequencyRegionForCI***Configures the reference frequency region where a detected UL CI is applicable (see TS 38.213 [13], clause 11.5). It is defined in the same way as *locationAndBandwidth*. |
| ***positionInDCI***Starting position (in number of bit) of the *ci-PayloadSize* bit CI value applicable for SUL of this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.5). |
| ***positionInDCI-ForSUL***Starting position (in number of bit) of the *ci-PayloadSize* bit CI value applicable for this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.5). |
| ***timeDurationForCI***Configures the duration of the reference time region in symbols where a detected UL CI is applicable of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.5). If the configured UL CI monitoring periodicity is larger than 1 slot or 1 slot with only one monitoring occasion, the UE applies the same as the configured UL CI monitoring periodicity, |
| ***timeFrequencyRegion***Configures the reference time and frequeny region where a detected UL CI is applicable of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.5). |
| ***timeGranularityForCI***Configures the number of partitions within the time region of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.5). |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *SUL-Only* | The field is optionally present, Need R, if this serving cell is configured with a supplementary uplink (SUL). It is absent otherwise. |
| *SymbolPeriodicity* | This field is mandatory present if the configured UL CI monitoring periodicity is less than 1 slot with only one monitoring occasion, Need M, otherwise absent. |

*END OF CHANGES*