**3GPP TSG-RAN WG2 Meeting #131 R2-250xxxx**

**Bengaluru, India, 25th – 29th August 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **5410** | **rev** | **1** | **Current version:** | **18.6.0** |  |
|  |
| *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:***  | Introduction of 32 HARQ processes to TN [TN32HARQ] |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | TEI19 |  | ***Date:*** | 2025-08-28 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)Rel-20 (Release 20)* |
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| ***Reason for change:*** | In RAN1 TEI19, 32 HARQ processes are introduced to TN. According to the high layer parameter list from RAN1 R1-2503243, the related RRC parameters need to be introduced in the spec. |
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| ***Summary of change:*** | In 6.3.2, add the new RRC parameters for configurations of "HARQ process number" field in DCI formats (formats 0\_1/ 0\_2/ 0\_3/ 1\_1/ 1\_2/ 1\_3.) with the extended size. |
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| ***Consequences if not approved:*** | The 32 HARQ processes are not supported in TN. |
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| ***Clauses affected:*** | 6.3.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **x** |  |  Other core specifications  | TS/TR 38.212 CR 0222  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

Start of Change

### 6.3.2 Radio resource control information elements

#### – PDSCH-Config

The *PDSCH-Config* IE is used to configure the UE specific PDSCH parameters. If this IE is used for MBS CFR, the following fields shall be absent: *tci-StatesToAddModList*, *tci-StatesToReleaseList*, *zp-CSI-RS-ResourceToAddModList*, *minimumSchedulingOffsetK0*, *antennaPortsFieldPresenceDCI-1-2*, *aperiodicZP-CSI-RS-ResourceSetsToAddModListDCI-1-2*, *aperiodicZP-CSI-RS-ResourceSetsToReleaseListDCI-1-2*, *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2*, *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2*, *dmrs-SequenceInitializationDCI-1-2*, *harq-ProcessNumberSizeDCI-1-2*, *mcs-TableDCI-1-2*, *numberOfBitsForRV-DCI-1-2*, *pdsch-AggregationFactor*, *pdsch-TimeDomainAllocationListDCI-1-2*, *prb-BundlingTypeDCI-1-2*, *priorityIndicatorDCI-1-2*, *rateMatchPatternGroup1DCI-1-2*, *rateMatchPatternGroup2DCI-1-2*, *resourceAllocationType1GranularityDCI-1-2*, *vrb-ToPRB-InterleaverDCI-1-2*, *referenceOfSLIVDCI-1-2*, *resourceAllocationDCI-1-2*, *dataScramblingIdentityPDSCH2-r16*, *repetitionSchemeConfig*, *pdsch-ConfigDCI-1-3*.

*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

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 maxMIMO-Layers-r16 SetupRelease { MaxMIMO-LayersDL-r16 } OPTIONAL, -- Need M

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

 -- Start of the parameters for DCI format 1\_2 introduced in V16.1.0

 antennaPortsFieldPresenceDCI-1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 aperiodicZP-CSI-RS-ResourceSetsToAddModListDCI-1-2-r16 SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet

 OPTIONAL, -- Need N

 aperiodicZP-CSI-RS-ResourceSetsToReleaseListDCI-1-2-r16 SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId

 OPTIONAL, -- Need N

 dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2-r16 SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

 dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2-r16 SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

 dmrs-SequenceInitializationDCI-1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 harq-ProcessNumberSizeDCI-1-2-r16 INTEGER (0..4) OPTIONAL, -- Need R

 mcs-TableDCI-1-2-r16 ENUMERATED {qam256, qam64LowSE} OPTIONAL, -- Need S

 numberOfBitsForRV-DCI-1-2-r16 INTEGER (0..2) OPTIONAL, -- Need R

 pdsch-TimeDomainAllocationListDCI-1-2-r16 SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }

 OPTIONAL, -- Need M

 prb-BundlingTypeDCI-1-2-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 R

 priorityIndicatorDCI-1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 rateMatchPatternGroup1DCI-1-2-r16 RateMatchPatternGroup OPTIONAL, -- Need R

 rateMatchPatternGroup2DCI-1-2-r16 RateMatchPatternGroup OPTIONAL, -- Need R

 resourceAllocationType1GranularityDCI-1-2-r16 ENUMERATED {n2,n4,n8,n16} OPTIONAL, -- Need S

 vrb-ToPRB-InterleaverDCI-1-2-r16 ENUMERATED {n2, n4} OPTIONAL, -- Need S

 referenceOfSLIVDCI-1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 resourceAllocationDCI-1-2-r16 ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch}

 OPTIONAL, -- Need M

 -- End of the parameters for DCI format 1\_2 introduced in V16.1.0

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

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

 pdsch-TimeDomainAllocationList-r16 SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 } OPTIONAL, -- Need M

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

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 repetitionSchemeConfig-v1630 SetupRelease { RepetitionSchemeConfig-v1630} OPTIONAL -- Need M

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 pdsch-HARQ-ACK-OneShotFeedbackDCI-1-2-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdsch-HARQ-ACK-EnhType3DCI-1-2-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdsch-HARQ-ACK-EnhType3DCI-Field-1-2-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 pdsch-HARQ-ACK-RetxDCI-1-2-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 pucch-sSCellDynDCI-1-2-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

 dl-OrJointTCI-StateList-r17 CHOICE {

 explicitlist SEQUENCE {

 dl-OrJointTCI-StateToAddModList-r17 SEQUENCE (SIZE (1..maxNrofTCI-States)) OF TCI-State

 OPTIONAL, -- Need N

 dl-OrJointTCI-StateToReleaseList-r17 SEQUENCE (SIZE (1..maxNrofTCI-States)) OF TCI-StateId

 OPTIONAL -- Need N

 },

 unifiedTCI-StateRef-r17 ServingCellAndBWP-Id-r17

 } OPTIONAL, -- Need R

 beamAppTime-r17 ENUMERATED {n1, n2, n4, n7, n14, n28, n42, n56, n70, n84, n98, n112, n224, n336, spare2,

 spare1} OPTIONAL, -- Need R

 dummy SetupRelease { Dummy-TDRA-List } OPTIONAL, -- Need M

 dmrs-FD-OCC-DisabledForRank1-PDSCH-r17 ENUMERATED {true} OPTIONAL, -- Need R

 minimumSchedulingOffsetK0-r17 SetupRelease { MinSchedulingOffsetK0-Values-r17 } OPTIONAL, -- Need M

 harq-ProcessNumberSizeDCI-1-2-v1700 INTEGER (0..5) OPTIONAL, -- Need R

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

 mcs-Table-r17 ENUMERATED {qam1024} OPTIONAL, -- Need R

 mcs-TableDCI-1-2-r17 ENUMERATED {qam1024} OPTIONAL, -- Need R

 xOverheadMulticast-r17 ENUMERATED {xOh6, xOh12, xOh18} OPTIONAL, -- Need S

 priorityIndicatorDCI-4-2-r17 ENUMERATED {enabled} OPTIONAL, -- Need S

 sizeDCI-4-2-r17 INTEGER (20..maxDCI-4-2-Size-r17) OPTIONAL -- Need R

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 pdsch-TimeDomainAllocationListForMultiPDSCH-r17 SetupRelease { MultiPDSCH-TDRA-List-r17 } OPTIONAL -- Need M

 ]],

 [[

 advancedReceiver-MU-MIMO-r18 SetupRelease { AdvancedReceiver-MU-MIMO-r18 } OPTIONAL, -- Need M

 pdsch-ConfigDCI-1-3-r18 SetupRelease { PDSCH-ConfigDCI-1-3-r18 } OPTIONAL -- Need M

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 pdsch-ConfigDCI-1-3-v1860 SetupRelease { PDSCH-ConfigDCI-1-3-v1860 } OPTIONAL -- Need M

 ]],

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 harq-ProcessNumberSizeDCI-1-1-Ext-r19 INTEGER (5) OPTIONAL, -- Need R

 harq-ProcessNumberSizeDCI-1-2-Ext-r19 INTEGER (0..5) OPTIONAL, -- Need R

 pdsch-ConfigDCI-1-3-v19xy SetupRelease { PDSCH-ConfigDCI-1-3-v19xy } 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)

MinSchedulingOffsetK0-Values-r17 ::= SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK0-SchedulingOffset-r17)

MaxMIMO-LayersDL-r16 ::= INTEGER (1..8)

PDSCH-ConfigDCI-1-3-r18 ::= SEQUENCE {

 resourceAllocationDCI-1-3-r18 ENUMERATED {resourceAllocationType0, resourceAllocationType1, dynamicSwitch}

 OPTIONAL, -- Need M

 rbg-SizeDCI-1-3-r18 ENUMERATED {config1, config2, config3, spare1} OPTIONAL, -- Cond DCI-1-3

 resourceAllocationType1GranularityDCI-1-3-r18 ENUMERATED {n2,n4,n8,n16} OPTIONAL, -- Need S

 numberOfBitsForRV-DCI-1-3-r18 INTEGER (0..2) OPTIONAL, -- Need R

 harq-ProcessNumberSizeDCI-1-3-r18 INTEGER (0..5) OPTIONAL -- Need R

}

PDSCH-ConfigDCI-1-3-v1860 ::= SEQUENCE {

 enabledDefaultBeamForMultiCellScheduling-r18 ENUMERATED {enabled}

}

PDSCH-ConfigDCI-1-3-v19xy ::= SEQUENCE {

 harq-ProcessNumberSizeDCI-1-3-Ext-r19 INTEGER (0..5) OPTIONAL -- Need R

}

-- TAG-PDSCH-CONFIG-STOP

-- ASN1STOP

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| --- |
| ***PDSCH-Config* field descriptions** |
| ***advancedReceiver-MU-MIMO***A set of assistance information for R-ML (reduced complexity ML) receivers with enhanced inter-user interference suppression for MU-MIMO transmissions. |
| ***antennaPortsFieldPresenceDCI-1-2***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). If neither *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2* nor *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2* is configured, this field is absent. |
| ***aperiodic-ZP-CSI-RS-ResourceSetsToAddModList, aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2***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* applies to DCI format 1\_1 and the field *aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.4.2 and TS 38.212 [17] clause 7.3.1). |
| ***beamAppTime***Indicates the first slot to apply the unified TCI indicated by DCI as specified in TS 38.214 Clause 5.1.5. The value n1 means 1 symbol, n2 two symbols and so on. The first slot is at least Y symbols indicated by beamAppTime parameter after the last symbol of the acknowledgment of the joint or separate DL/UL beam indication. The same value shall be configured for all serving cells in any one of the *simultaneousU-TCI-UpdateListN* configured in IE *CellGroupConfig* based on the smallest SCS of the active BWP. |
| ***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. |
| ***dl-OrJointTCI-StateToAddModList***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, PDCCH DMRS ports, and CSI-RS, and in case of joint mode, also the PUSCH, PUCCH and SRS (see TS 38.214 [19], clause 5.1.5). |
| ***dmrs-DownlinkForPDSCH-MappingTypeA, dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2***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* applies to DCI formats 1\_1 and 1\_3, and the field *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2* applies to DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-DownlinkForPDSCH-MappingTypeB, dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2***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* applies to DCI formats 1\_1 and 1\_3, and the field *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2* applies to DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-FD-OCC-DisabledForRank1-PDSCH***If configured, the UE may assume that the set of remaining orthogonal antenna ports, which are within the same code division multiplexing (CDM) group and have different frequency domain orthogonal cover codes (FD-OCC), are not associated with the PDSCH of another UE (see TS 38.214 [19], clause 5.1.6.2). It is applicable for PDSCH SCS of 480 and 960 kHz when rank 1 PDSCH with type-1 or type-2 DMRS is scheduled. If *dmrs-TypeEnh-r18* is configured, this field is not configured. |
| ***dmrs-SequenceInitializationDCI-1\_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). |
| ***dummy***This field is not used in the specification. If received it shall be ignored by the UE. |
| ***harq-ProcessNumberSizeDCI-1-2***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). Only one of this field and *harq-ProcessNumberSizeDCI-1-2-Ext* is configured by network. |
| ***harq-ProcessNumberSizeDCI-1-1-Ext***Configure the number of bits for the field "HARQ process number" in DCI format 1\_1 in TN (see TS 38.212 [17], clause 7.3.1). For FR1, this field can only be configured when the maximum number of layers configured for PDSCH is no more than 4. |
| ***harq-ProcessNumberSizeDCI-1-2-Ext***Configure the number of bits for the field "HARQ process number" in DCI format 1\_2 in TN (see TS 38.212 [17], clause 7.3.1). For FR1, this field can only be configured when the maximum number of layers configured for PDSCH is no more than 4. Only one of this field and *harq-ProcessNumberSizeDCI-1-2* is configured by network. |
| ***maxMIMO-Layers***Indicates the maximum number of MIMO layers to be used for PDSCH in this DL BWP. If not configured, the UE uses the *maxMIMO-Layers* configuration in IE *PDSCH-ServingCellConfig* of the serving cell to which this BWP belongs, 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* of the serving cell to which this BWP belongs.For MBS multicast, indicates the maximum number of MIMO layers to be used for group-common PDSCH of MBS multicast in this CFR. If not configured for CFR, the UE applies value 1. The value of *maxMIMO-Layers* for a CFR shall be smaller than or equal to the value of *maxMIMO-Layers* configured in *PDSCH-ServingCellConfig* IE of the serving cell to which this CFR belongs. |
| ***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***Indicates which MCS table the UE shall use for PDSCH for DCI formats 1\_0, 1\_1 and 1\_3 (see TS 38.214 [19], clause 5.1.3.1). If all fields are absent the UE applies the value 64QAM. If the field *mcs-Table-r17* is present for DCI formats 1\_1 and 1\_3, the network does not configure the field *mcs-Table* (without suffix). For an (e)RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH. |
| ***mcs-TableDCI-1-2***Indicates which MCS table the UE shall use for PDSCH for DCI format 1\_2 (see TS 38.214 [19], clause 5.1.3.1). If all fields are absent the UE applies the value 64QAM. If the field *mcs-TableDCI-1-2-r17* is present, the network does not configure the field *mcs-TableDCI-1-2-r16*. For an (e)RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH. |
| ***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-DCI-1-2***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 in *PDSCH-Config* which is not used for MBS CFR, the UE applies the value 1. |
| ***pdsch-HARQ-ACK-EnhType3DCI-1-2***When configured, enhanced Type 3 HARQ-ACK codebook triggering by DCI format 1\_2 is enabled. |
| ***pdsch-HARQ-ACK-EnhType3DCI-Field-1-2***Enables the enhanced Type 3 codebook through a new DCI field to indicate the enhanced Type 3 HARQ-ACK codebook in DCI format 1\_2 if the more than one enhanced Type 3 HARQ-ACK codebook is configured for the primary PUCCH cell group. |
| ***pdsch-HARQ-ACK-OneShotFeedbackDCI-1-2***When configured, DCI format 1\_2 can request the UE to report A/N for all HARQ processes and all component carriers configured in the PUCCH group (see TS 38.212 [17], clause 7.3.1). |
| ***pdsch-HARQ-ACK-RetxDCI-1-2***When configured, DCI format 1\_2 can request the UE to perform a HARQ-ACK re-transmission on a PUCCH resource (see TS 38.213 [13], clause 9.1.5). |
| ***pdsch-TimeDomainAllocationList, pdsch-TimeDomainAllocationListDCI-1-2, pdsch-TimeDomainAllocationListForMultiPDSCH***List of time-domain configurations for timing of DL assignment to DL data.The field *pdsch-TimeDomainAllocationList* (with or without suffix) applies to DCI format 1\_0, DCI format 1\_1 and DCI format 1\_3 (see table 5.1.2.1.1-1 in TS 38.214 [19]), and if the field *pdsch-TimeDomainAllocationListDCI-1-2* is not configured, to DCI format 1\_2. If the field *pdsch-TimeDomainAllocationListDCI-1-2* is configured, it applies to DCI format 1\_2 (see table 5.1.2.1.1-1A in TS 38.214 [19]). The field *pdsch-TimeDomainAllocationListForMultiPDSCH* applies to DCI format 1\_1.The network does not configure the *pdsch-TimeDomainAllocationList-r16* simultaneously with the *pdsch-TimeDomainAllocationList* (without suffix) in the same *PDSCH-Config*. |
| ***prb-BundlingType,*** ***prb-BundlingTypeDCI-1-2***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* applies to DCI formats 1\_1 and 1\_3, and the field *prb-BundlingTypeDCI-1-2* applies to DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.3). |
| ***priorityIndicatorDCI-1-1, priorityIndicatorDCI-1-2, priorityIndicatorDCI-4-2***Configure the presence of "priority indicator" in DCI format 1\_1/1\_2/4\_2. When the field is absent in the IE, then 0 bit for "priority indicator" in DCI format 1\_1/1\_2/4\_2. The field *priorityIndicatorDCI-1-1* applies to DCI format 1\_1, the field *priorityIndicatorDCI-1-2* applies to DCI format 1\_2 and the field *priorityIndicatorDCI-4-2* applies to DCI format 4\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9). |
| ***pucch-sSCellDynDCI-1-2***When configured, PUCCH cell switching based on dynamic indication in DCI format 1\_2 is enabled (see TS 38.213 [13], clause 9.A). |
| ***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.If *p-ZP-CSI-RS-ResourceSet* is configured in both *PDSCH-Config* for MBS CFR and *PDSCH-Config* for the assoicated BWP, it is subject to UE capability whether the *p-ZP-CSI-RS-ResourceSet* configured in *PDSCH-Config* for MBS CFR can be different from the *p-ZP-CSI-RS-ResourceSet* configured in *PDSCH-Config* for the assoicated BWP. |
| ***rateMatchPatternGroup1, rateMatchPatternGroup1DCI-1-2***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* applies to DCI formats 1\_1 and 1\_3, and the field *rateMatchPatternGroup1DCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.4.1). |
| ***rateMatchPatternGroup2, rateMatchPatternGroup2DCI-1-2***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* applies to DCI formats 1\_1 and 1\_3, and the field *rateMatchPatternGroup2DCI-1-2* applies to DCI format 1\_2 (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). If a *RateMatchPattern* with the same *RateMatchPatternId* is configured in both MBS CFR and its associated BWP, the entire *RateMatchPattern* configuration, including the set of RBs/REs indicated by the patterns for the rate matching around, shall be the same and they are counted as a single rate match pattern in the total configured rate match patterns as defined in TS 38.214 [19]. |
| ***rbg-Size***Selection between config 1 and config 2 for RBG size for PDSCH except PDSCH scheduled by DCI format 1\_3. The UE ignores this field if *resourceAllocation* is set to *resourceAllocationType1* (see TS 38.214 [19], clause 5.1.2.2.1). |
| ***referenceOfSLIVDCI-1-2***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. 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. The network does not configure *repetitionSchemeConfig-r16* and *repetitionSchemeConfig-v1630* simultaneously to *setup* in the same *PDSCH-Config*. The network does not configure this parameter and *sfnSchemePDSCH* in *MIMOParam-r17* simultaneously in the same serving cell. |
| ***resourceAllocation, resourceAllocationDCI-1-2***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* applies to DCI format 1\_1, and the field *resourceAllocationDCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.2.2). |
| ***resourceAllocationType1GranularityDCI-1-2***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). |
| ***sizeDCI-4-2***Indicates the size of DCI format 4-2 (see TS 38.213 [13], clause 10.1). |
| ***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). If *unifiedTCI-StateType* is configured for the serving cell, no element in this list is configured. |
| ***unifiedTCI-StateRef***Provides the serving cell and BWP where the configuration for *dl-OrJointTCI-StateToAddModList-r17* are defined. When this field is present, *dl-OrJointTCI-StateToAddModList* and *dl-OrJointTCI-StateToReleaseList* are not present. The value of *unifiedTCI-StateType* of current serving cell is the same in the serving cell indicated by *unifiedTCI-StateRef.* |
| ***vrb-ToPRB-Interleaver, vrb-ToPRB-InterleaverDCI-1-2***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. |
| ***xOverheadMulticast***Accounts for an overhead from CSI-RS, CORESET etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19]). |
| ***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]). |

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| ***PDSCH-ConfigDCI-1-3* field descriptions** |
| ***enabledDefaultBeamForMultiCellScheduling***This field indicates whether default beam selection for DCI format 1\_3 scheduled PDSCH or aperiodic CSI-RS is enabled (see TS 38.214 [19], clause 5.1.5 and clause 5.2.1.5). |
| ***harq-ProcessNumberSizeDCI-1-3***Configure the number of bits for the field "HARQ process number" in DCI format 1\_3 (see TS 38.212 [17], clause 7.3.1). Only one of this field and *harq-ProcessNumberSizeDCI-1-3-Ext* is configured by network. |
| ***harq-ProcessNumberSizeDCI-1-3-Ext***Configure the number of bits for the field "HARQ process number" in DCI format 1\_3 in TN (see TS 38.212 [17], clause 7.3.1). This field can only be configured when the maximum number of layers configured for PDSCH is no more than 4. Only one of this field and *harq-ProcessNumberSizeDCI-1-3* is configured by network. |
| ***numberOfBitsForRV-DCI-1-3***Configures the number of bits for "Redundancy version" in the DCI format 1\_3 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.1). |
| ***rbg-SizeDCI-1-3***Selection among config 1, config 2 and config 3 for RBG size for PDSCH scheduled by DCI format 1\_3. The UE ignores this field if resourceAllocationDCI-1-3 is set to resourceAllocationType1. (see TS 38.214 [19], clause 5.1.2.2.1). |
| ***resourceAllocationDCI-1-3***Configuration of resource allocation type 0 and resource allocation type 1 for DCI format 1\_3 (see TS 38.214 [19], clause 5.1.2.2). |
| ***resourceAllocationType1GranularityDCI-1-3***Configure the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 1\_3. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 5.1.2.2.2). |

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| --- | --- |
| **Conditional Presence** | **Explanation** |
| *DCI-1-3* | This field is mandatory present when *ScheduledCellListDCI-1-3* is configured to the serving cell. Otherwise, it is absent, Need R. |

#### – PUSCH-Config

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

*PUSCH-Config* information element

-- ASN1START

-- TAG-PUSCH-CONFIG-START

PUSCH-Config ::= SEQUENCE {

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

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

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

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

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

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

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

 OPTIONAL, -- Need M

 resourceAllocation ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},

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

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

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

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

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

 codebookSubset ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent,nonCoherent}

 OPTIONAL, -- Cond codebookBased

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

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

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

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

 ...,

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

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

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

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

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

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

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

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

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

 frequencyHoppingDCI-0-2-r16 CHOICE {

 pusch-RepTypeA ENUMERATED {intraSlot, interSlot},

 pusch-RepTypeB ENUMERATED {interRepetition, interSlot}

 } OPTIONAL, -- Need S

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

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

 OPTIONAL, -- Cond codebookBased

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

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

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

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

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

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

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

 OPTIONAL, -- Need M

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

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

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

 OPTIONAL, -- Need M

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

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

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

 OPTIONAL, -- Need M

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

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

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

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

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

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

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

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

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

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

 OPTIONAL, -- Need M

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 harq-ProcessNumberSizeDCI-0-1-Ext-r19 INTEGER (5) OPTIONAL, -- Need R

 harq-ProcessNumberSizeDCI-0-2-Ext-r19 INTEGER (0..5) OPTIONAL, -- Need R

 pusch-ConfigDCI-0-3-v19xy SetupRelease { PUSCH-ConfigDCI-0-3-v19xy } OPTIONAL -- Need M

 ]]

}

UCI-OnPUSCH ::= SEQUENCE {

 betaOffsets CHOICE {

 dynamic SEQUENCE (SIZE (4)) OF BetaOffsets,

 semiStatic BetaOffsets

 } OPTIONAL, -- Need M

 scaling ENUMERATED { f0p5, f0p65, f0p8, f1 }

}

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

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

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

 betaOffsetsDCI-0-2-r16 CHOICE {

 dynamicDCI-0-2-r16 CHOICE {

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

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

 },

 semiStaticDCI-0-2-r16 BetaOffsets

 } OPTIONAL, -- Need M

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

}

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

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

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

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

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

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

BetaOffsetsCrossPriSel-r17 ::= CHOICE {

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

 semiStatic-r17 BetaOffsetsCrossPri-r17

}

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

 dynamicDCI-0-2-r17 CHOICE {

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

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

 },

 semiStaticDCI-0-2-r17 BetaOffsetsCrossPri-r17

}

MPE-Resource-r17 ::= SEQUENCE {

 mpe-ResourceId-r17 MPE-ResourceId-r17,

 cell-r17 ServCellIndex OPTIONAL, -- Need R

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

 mpe-ReferenceSignal-r17 CHOICE {

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

 ssb-Resource-r17 SSB-Index

 }

}

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

SDM-Scheme-r18 ::= SEQUENCE {

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

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

}

SFN-Scheme-r18 ::= SEQUENCE {

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

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

}

CodebookTypeUL-r18 ::= CHOICE {

 codebook1-r18 ENUMERATED {ng1n4n1, ng1n2n2},

 codebook2-r18 ENUMERATED {ng2},

 codebook3-r18 ENUMERATED {ng4},

 codebook4-r18 ENUMERATED {ng8}

}

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

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

 OPTIONAL, -- Need M

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

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

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

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

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

}

PUSCH-ConfigDCI-0-3-v19xy ::= SEQUENCE {

 harq-ProcessNumberSizeDCI-0-3-Ext-r19 INTEGER (0..5) OPTIONAL -- Need R

}

-- TAG-PUSCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***PUSCH-Config* field descriptions** |
| ***antennaPortsFieldPresenceDCI-0-2***Configure the presence of "Antenna ports" field in DCI format 0\_2. When the field is configured, then the "Antenna ports" field is present in DCI format 0\_2. Otherwise, the field size is set to 0 for DCI format 0\_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* nor *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* is configured, this field is absent. |
| ***applyIndicatedTCI-State***This field indicates, for a PUSCH transmission, if UE applies the first or the second "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 6.1. |
| ***availableSlotCounting***Indicate whether PUSCH repetitions counted on the basis of available slots is enabled. If the field is absent, PUSCH repetitions counted on the basis of available slots is disabled. |
| ***betaOffsetsCrossPri0, betaOffsetsCrossPri1,*** ***betaOffsetsCrossPri0DCI-0-2, betaOffsetsCrossPri1DCI-0-2***Selection between and configuration of dynamic and semi-static beta-offset for multiplexing HARQ-ACK on dynamically scheduled PUSCH with different priorities, see TS 38.213 [13], clause 9.3.The field *betaOffsetsCrossPrio0* indicates multiplexing low priority (LP) HARQ-ACK on dynamically scheduled high priority (HP) PUSCH.The field *betaOffsetsCrossPrio1* indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH.The field *betaOffsetsCrossPrio0DCI-0-2* indicates multiplexing LP HARQ-ACK on dynamically scheduled HP PUSCH by DCI format 0\_2.The field *betaOffsetsCrossPrio1DCI-0-2* indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH by DCI format 0\_2. |
| ***codebookSubset, codebookSubsetDCI-0-2***Subset of PMIs addressed by TPMI, where PMIs are those supported by UEs with maximum coherence capabilities (see TS 38.214 [19], clause 6.1.1.1). The field *codebookSubset* applies to DCI formats 0\_1 and 0\_3, and the field *codebookSubsetDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.1.1). |
| ***codebookTypeUL***Configures a codebook and the corresponding number of antenna port groups for codebook-based transmission of PUSCH with 8 antenna ports, see TS 38.211 [16], tables 6.3.1.5-9 to 6.3.1.5-47, and table 6.3.1.5-8 respectively). The values *ng1n4n1* and *ng1n2n2* correspond to codebooks with one antenna port group (Ng=1), while *ng2, ng4*, and *ng8* correspond to codebooks with Ng=2, 4, and 8 antenna port groups, respectively. |
| ***dataScramblingIdentityPUSCH***Identifier used to initialise data scrambling (c\_init) for PUSCH. If the field is absent, the UE applies the physical cell ID. (see TS 38.211 [16], clause 6.3.1.1). |
| ***dmrs-BundlingPUSCH-Config***Configure the parameters for DMRS bundling for PUSCH (see TS 38.214 [19], clause 6.1.7). In this release, this is not applicable to FR2-2. |
| ***dmrs-SequenceInitializationDCI-0-2***Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 0\_2. If the field is absent, then 0 bit for the field "DMRS Sequence Initialization" in DCI format 0\_2. If the field is present, then the number of bits is determined in the same way as DCI format 0\_1 (see TS 38.212 [17], clause 7.3.1).  |
| ***dmrs-UplinkForPUSCH-MappingTypeA, dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2***DMRS configuration for PUSCH transmissions using PUSCH mapping type A (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeA* applies to DCI formats 0\_1 and 0\_3, and the field *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-UplinkForPUSCH-MappingTypeB, dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2***DMRS configuration for PUSCH transmissions using PUSCH mapping type B (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeB* applies to DCI formats 0\_1 and 0\_3, and the field *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dynamicTransformPrecoderFieldPresenceDCI-0-1***Configure the presence of "Dynamic Transform Precoder" field in DCI format 0\_1. When the field is configured, then the "Dynamic Transform Precoder" field is present in DCI format 0\_1. Otherwise, the field size is set to 0 for DCI format 0\_1 (See TS 38.212 [17]). The network ensures *dynamicTransformPrecoderFieldPresenceDCI-0-1-r18* and *twoPHRMode-r17* cannot be configured at the same time for a UE. |
| ***dynamicTransformPrecoderFieldPresenceDCI-0-2***Configure the presence of "Dynamic Transform Precoder" field in DCI format 0\_2. When the field is configured, then the "Dynamic Transform Precoder" field is present in DCI format 0\_2. Otherwise, the field size is set to 0 for DCI format 0\_2 (See TS 38.212 [17]). The network ensures *dynamicTransformPrecoderFieldPresenceDCI-0-2-r18* and *twoPHRMode*-r17 cannot be configured at the same time for a UE. |
| ***frequencyHopping***The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3). The field *frequencyHopping* applies to DCI formats 0\_0, 0\_1 and 0\_3 for 'pusch-RepTypeA'. |
| ***frequencyHoppingDCI-0-1***Indicates the frequency hopping scheme for DCI format 0\_1 when *pusch-RepTypeIndicatorDCI-0-1* is set to 'pusch-RepTypeB', The value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for DCI format 0\_1 for 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1). |
| ***frequencyHoppingDCI-0-2***Indicate the frequency hopping scheme for DCI format 0\_2. The value *intraSlot* enables 'intra-slot frequency hopping', and the value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. When *pusch-RepTypeIndicatorDCI-0-2* is not set to '*pusch-RepTypeB*', the frequency hopping scheme can be chosen between 'intra-slot frequency hopping and 'inter-slot frequency hopping' if enabled. When *pusch-RepTypeIndicatorDCI-0-2* is set to '*pusch-RepTypeB*', the frequency hopping scheme can be chosen between 'inter-repetition frequency hopping' and 'inter-slot frequency hopping' if enabled. If the field is absent, frequency hopping is not configured for DCI format 0\_2 (see TS 38.214 [19], clause 6.3). |
| ***frequencyHoppingOffsetLists, frequencyHoppingOffsetListsDCI-0-2***Set of frequency hopping offsets used when frequency hopping is enabled for granted transmission (not msg3) and type 2 configured grant activation (see TS 38.214 [19], clause 6.3). The field *frequencyHoppingOffsetLists* applies to DCI formats 0\_0, 0\_1 and 0\_3, and the field *frequencyHoppingOffsetListsDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.3). |
| ***harq-ProcessNumberSizeDCI-0-2***Configure the number of bits for the field "HARQ process number" in DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). Only one of this field and *harq-ProcessNumberSizeDCI-0-2-Ext* is configured by network. |
| ***harq-ProcessNumberSizeDCI-0-1-Ext***Configure the number of bits for the field "HARQ process number" in DCI format 0\_1 in TN (see TS 38.212 [17], clause 7.3.1). This field can only be configured when the maximum number of layers configured for PUSCH is no more than 4. |
| ***harq-ProcessNumberSizeDCI-0-2-Ext***Configure the number of bits for the field "HARQ process number" in DCI format 0\_2 for TN (see TS 38.212 [17], clause 7.3.1). This field can only be configured when the maximum number of layers configured for PUSCH is no more than 4. Only one of this field and *harq-ProcessNumberSizeDCI-0-2* is configured by network. |
| ***invalidSymbolPattern***Indicates one pattern for invalid symbols for PUSCH transmission repetition type B applicable to both DCI format 0\_1 and 0\_2. If *InvalidSymbolPattern* is not configured, semi-static flexible symbols are used for PUSCH. Segmentation occurs only around semi-static DL symbols (see TS 38.214 [19] clause 6.1). |
| ***invalidSymbolPatternIndicatorDCI-0-1, invalidSymbolPatternIndicatorDCI-0-2***Indicates the presence of an additional bit in the DCI format 0\_1/0\_2. If *invalidSymbolPattern* is absent, then both *invalidSymbolPatternIndicatorDCI-0-1* and *invalidSymbolPatternIndicatorDCI-0-2* are absent. The field *invalidSymbolPatternIndicatorDCI-0-1* applies to the DCI format 0\_1 and the field *invalidSymbolPatternIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19] clause 6.1). If the field is absent, the UE behaviour is specified in TS 38.214 [19], clause 6.1.2.1. |
| ***mappingPattern***Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern for when two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook' for PUSCH transmission and the PUSCH transmission occasions are associated with both SRS resource sets. |
| ***maxRank, maxRankDCI-0-2***Subset of PMIs addressed by TRIs from 1 to ULmaxRank (see TS 38.214 [19], clause 6.1.1.1). The field *maxRank* applies to DCI formats 0\_1 and 0\_3, and the field *maxRankDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.1.1). If network configures *maxRank-v1810* UE ignores *maxRank* (without suffix). |
| ***mcs-Table, mcs-TableFormat0-2***Indicates which MCS table the UE shall use for PUSCH without transform precoder (see TS 38.214 [19], clause 6.1.4.1). If the field is absent the UE applies the value 64QAM. The field *mcs-Table* applies to DCI formats 0\_0, 0\_1 and 0\_3, and the field *mcs-TableDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.4.1). |
| ***mcs-TableTransformPrecoder, mcs-TableTransformPrecoderDCI-0-2***Indicates which MCS table the UE shall use for PUSCH with transform precoding (see TS 38.214 [19], clause 6.1.4.1) If the field is absent the UE applies the value 64QAM. The field *mcs-TableTransformPrecoder* applies to DCI formats 0\_0, 0\_1 and 0\_3, and the field *mcs-TableTransformPrecoderDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.4.1). |
| ***minimumSchedulingOffsetK2***List of minimum K2 values. Minimum K2 parameter denotes minimum applicable value(s) for the *Time domain resource assignment* table for PUSCH (see TS 38.214 [19], clause 6.1.2.1). |
| ***mpe-ResourcePoolToAddModList***List of SSB/CSI-RS resources for P-MPR reporting. Each resource is configured with serving cell index where the resource is configured for the UE. The *additionalPCI* is configured only if the resource is SSB. For each resource, if neither *cell* nor *additionalPCI* is present, the SSB/CSI-RS resource is from the serving cell where the *PUSCH-Config* is configured. |
| ***multipanelSchemeSDM***Configures UE with a multiple panel simultaneous uplink transmission SDM scheme for PUSCH, as specified in TS 38.214 [19], clause 6.1. Network does not configure *multipanelSchemeSDM* with *multipanelSchemeSFN*. When this parameter is configured, two SRS resource sets with *usage* for *codebook* or *noncodebook* are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2*. |
| ***multipanelSchemeSFN***Configures UE with a multiple panel simultaneous uplink transmission SFN scheme for PUSCH, as specified in TS 38.214 [19], clause 6.1. Network does not configure *multipanelSchemeSFN* with *multipanelSchemeSDM*. When this parameter is configured, two SRS resource sets with *usage* for *codebook* or *noncodebook* are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2*. |
| ***numberOfBitsForRV-DCI-0-2***Configures the number of bits for "Redundancy version" in the DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1). |
| ***numberOfInvalidSymbolsForDL-UL-Switching***Indicates the number of symbols after the last semi-static DL symbol that are invalid symbols for PUSCH repetition Type B. If it is absent, no symbol is explicitly defined for DL-to-UL switching (see TS 38.214 [19], clause 6.1). |
| ***priorityIndicatorDCI-0-1, priorityIndicatorDCI-0-2***Configures the presence of "priority indicator" in DCI format 0\_1/0\_2. When the field is absent in the IE, then the UE shall apply 0 bit for "Priority indicator" in DCI format 0\_1/0\_2. The field *priorityIndicatorDCI-0-1* applies to DCI format 0\_1 and the field *priorityIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13] clause 9). |
| ***pusch-AggregationFactor***Number of repetitions for data (see TS 38.214 [19], clause 6.1.2.1). If the field is absent the UE applies the value 1. |
| ***pusch-PowerControl***Configures power control parameters PUSCH transmission.  |
| ***pusch-RepTypeIndicatorDCI-0-1, pusch-RepTypeIndicatorDCI-0-2***Indicates whether UE follows the behavior for "PUSCH repetition type A" or the behavior for "PUSCH repetition type B" for the PUSCH scheduled by DCI format 0\_1/0\_2 and for Type 2 CG associated with the activating DCI format 0\_1/0\_2.The value *pusch-RepTypeA* enables the 'PUSCH repetition type A' and the value *pusch-RepTypeB* enables the 'PUSCH repetition type B'. The field *pusch-RepTypeIndicatorDCI-0-1* applies to DCI format 0\_1 and the field *pusch-RepTypeIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***pusch-TimeDomainAllocationList***List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1). The field *pusch-TimeDomainAllocationList* applies to DCI format 0\_0, or DCI formats 0\_1 and 0\_3 when the field *pusch-TimeDomainAllocationListDCI-0-1* is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and tables 6.1.2.1.1-1A and 6.1.2.1.1-1C). The network does not configure the *pusch-TimeDomainAllocationList* (without suffix) simultaneously with the *pusch-TimeDomainAllocationListDCI-0-2-r16* or *pusch-TimeDomainAllocationListDCI-0-1-r16* or *pusch-TimeDomainAllocationListForMultiPUSCH-r16*. |
| ***pusch-TimeDomainAllocationListDCI-0-1***Configuration of the time domain resource allocation (TDRA) table for DCI formats 0\_1 and 0\_3 (see TS 38.214 [19], clause 6.1, tables 6.1.2.1.1-1A and 6.1.2.1.1-1C). |
| ***pusch-TimeDomainAllocationListDCI-0-2***Configuration of the time domain resource allocation (TDRA) table for DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2, table 6.1.2.1.1-1B). |
| ***pusch-TimeDomainAllocationListForMultiPUSCH***Configuration of the time domain resource allocation (TDRA) table for multiple PUSCH (see TS 38.214 [19], clause 6.1.2). The network configures at most 64 rows in this TDRA table in *PUSCH-TimeDomainResourceAllocationList-r16* configured by this field. This field is not configured simultaneously with *pusch-AggregationFactor* if *extendedK2* is not configured. The network does not configure the *pusch-TimeDomainAllocationListForMultiPUSCH-r16* simultaneously with the *pusch-TimeDomainAllocationListDCI-0-1-r16*. The network does not configure the *pusch-TimeDomainAllocationListForMultiPUSCH-r16* simultaneously with the *numberOfSlotsTBoMS-r17*. |
| ***rbg-Size***Selection between configuration 1 and configuration 2 for RBG size for PUSCH except PUSCH scheduled by DCI format 0\_3. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1). |
| ***resourceAllocation, resourceAllocationDCI-0-2***Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 6.1.2). The field *resourceAllocation* applies to DCI format 0\_1 and the field *resourceAllocationDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2). |
| ***resourceAllocationType1GranularityDCI-0-2***Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0\_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2). |
| ***secondTPCFieldDCI-0-1, secondTPCFieldDCI-0-2***A second TPC field can be configured via RRC for DCI-0-1 and DCI-0-2. Each TPC field is for each closed-loop index value respectively (i.e., 1st /2nd TPC fields correspond to "closedLoopIndex" value = 0 and 1, |
| ***sequenceOffsetForRV***Configures the RV offset for the starting RV for the first repetition (first actual repetition in PUSCH repetition Type B) towards the second 'SRS resource set' for PUSCH configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook'. |
| ***sTx-2Panel***Parameter to enable PUSCH+PUSCH multiple panel simultaneous uplink transmission, as specified in TS 38.214 [19], clause 6.1. |
| ***tp-pi2BPSK***Enables pi/2-BPSK modulation with transform precoding if the field is present and disables it otherwise.  |
| ***transformPrecoder***The UE specific selection of transformer precoder for PUSCH (see TS 38.214 [19], clause 6.1.3). When the field is absent the UE applies the value of the field *msg3-transformPrecoder* from *rach-ConfigCommon* included directly within BWP configuration (i.e., not included in *additionalRACH-ConfigList*). |
| ***txConfig***Whether UE uses codebook based or non-codebook based transmission (see TS 38.214 [19], clause 6.1.1). If the field is absent, the UE transmits PUSCH on one antenna port, see TS 38.214 [19], clause 6.1.1. |
| ***uci-OnPUSCH-ListDCI-0-1, uci-OnPUSCH-ListDCI-0-2***Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0\_1/0\_2. The field uci-OnPUSCH-ListDCI-0-1 applies to DCI format 0\_1 and the field uci-OnPUSCH-ListDCI-0-2 applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3). |
| ***ul-AccessConfigListDCI-0-1, ul-AccessConfigListDCI-0-2***List of the combinations of cyclic prefix extension, channel access priority class (CAPC), and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable for DCI format 0\_1 and DCI format 0\_2, respectively.The fields *ul-AccessConfigListDCI-0-1-r16* and *ul-AccessConfigListDCI-0-2-r17* are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.1.2-35). The field *ul-AccessConfigListDCI-0-1-r17* only contains a list of UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.1.2-35A). |
| ***ul-FullPowerTransmission***Configures the UE with UL full power transmission mode as specified in TS 38.213 [13]. This field is not configured if *ul-powerControl* is configured in the *BWP-UplinkDedicated* in which the *PUCCH-Config* is included. |

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| ***PUSCH-ConfigDCI-0-3* field descriptions** |
| ***harq-ProcessNumberSizeDCI-0-3***Configure the number of bits for the field "HARQ process number" in DCI format 0\_3 (see TS 38.212 [17], clause 7.3.1). Only one of this field and *harq-ProcessNumberSizeDCI-0-3-Ext* is configured by network. |
| ***harq-ProcessNumberSizeDCI-0-3-Ext***Configure the number of bits for the field "HARQ process number" in DCI format 0\_3 in TN (see TS 38.212 [17], clause 7.3.1). This field can only be configured when the maximum number of layers configured for PUSCH is no more than 4. Only one of this field and *harq-ProcessNumberSizeDCI-0-3* is configured by network. |
| ***numberOfBitsForRV-DCI-0-3***Configures the number of bits for "Redundancy version" in the DCI format 0\_3 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1). |
| ***rbg-SizeDCI-0-3***Selection among configuration 1, configuration 2 and configuration 3 for RBG size for PUSCH scheduled by DCI format 0\_3. The UE does not apply this field if *resourceAllocationDCI-0-3* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1). |
| ***resourceAllocationDCI-0-3***Configuration of resource allocation type 0 and resource allocation type 1 for DCI format 0\_3 (see TS 38.214 [19], clause 6.1.2). |
| ***resourceAllocationType1GranularityDCI-0-3***Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0\_3. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2). |
| ***uci-OnPUSCH-ListDCI-0-3***Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0\_3 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3). |

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

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

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

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

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