**3GPP TSG-RAN2 Meeting #127 *R2-2406603***

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

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.331** | **CR** | **4881** | **rev** | **-** | **Current version:** | **18.2.0** |  |
|  | | | | | | | | |
| *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:*** | Network energy savings for NR miscellaneous RRC CR | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | Netw\_Energy\_NR-Core | | | | |  | ***Date:*** | | | 2024-08-07 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Miscellaneous RRC CR with corrections to Release-18 Network energy savings for NR. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1) For SSB-less the term "default cell" is changed to the exact wording in RAN4 spec "reference serving cell" (TS 38.133, clause 8.3.2).  2) Clarified the behaviour when referenceCell is absent that it only applies for an inter-band SSB-less SCell.  3) Some IE names corrected to be in italics.  **Impact analysis**  Impacted functionality:  Network energy savings for NR  Inter-operability:  If the UE is implemented according to this CR but the network is not, there is no inter-operability issue.  If the network is implemented according to this CR but the UE is not, there is no inter-operability issue. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Release-18 Network energy savings for NR is not properly implemented in RRC. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.3.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*Start of changes*

### 6.3.2 Radio resource control information elements

*Unchanged Text is omitted*

#### – *CSI-AperiodicTriggerStateList*

The *CSI-AperiodicTriggerStateList* IE is used to configure the UE with a list of aperiodic trigger states. Each codepoint of the DCI field "CSI request" is associated with one trigger state (see TS 38.321 [3], clause 6.1.3.13). Upon reception of the value associated with a trigger state, the UE will perform measurement of CSI-RS, CSI-IM and/or SSB (reference signals) and aperiodic reporting on L1 according to all entries in the *associatedReportConfigInfoList* for that trigger state.

*CSI-AperiodicTriggerStateList* information element

-- ASN1START

-- TAG-CSI-APERIODICTRIGGERSTATELIST-START

CSI-AperiodicTriggerStateList ::= SEQUENCE (SIZE (1..maxNrOfCSI-AperiodicTriggers)) OF CSI-AperiodicTriggerState

CSI-AperiodicTriggerState ::= SEQUENCE {

associatedReportConfigInfoList SEQUENCE (SIZE(1..maxNrofReportConfigPerAperiodicTrigger)) OF CSI-AssociatedReportConfigInfo,

...,

[[

ap-CSI-MultiplexingMode-r17 ENUMERATED {enabled} OPTIONAL -- Need R

]],

[[

ltm-AssociatedReportConfigInfo-r18 LTM-CSI-ReportConfigId-r18 OPTIONAL -- Need R

]]

}

CSI-AssociatedReportConfigInfo ::= SEQUENCE {

reportConfigId CSI-ReportConfigId,

resourcesForChannel CHOICE {

nzp-CSI-RS SEQUENCE {

resourceSet INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),

qcl-info SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF TCI-StateId

OPTIONAL -- Cond Aperiodic

},

csi-SSB-ResourceSet INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfig)

},

csi-IM-ResourcesForInterference INTEGER(1..maxNrofCSI-IM-ResourceSetsPerConfig) OPTIONAL, -- Cond CSI-IM-ForInterference

nzp-CSI-RS-ResourcesForInterference INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig) OPTIONAL, -- Cond NZP-CSI-RS-ForInterference

...,

[[

resourcesForChannel2-r17 CHOICE {

nzp-CSI-RS2-r17 SEQUENCE {

resourceSet2-r17 INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),

qcl-info2-r17 SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF TCI-StateId

OPTIONAL -- Cond Aperiodic

},

csi-SSB-ResourceSet2-r17 INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfigExt)

} OPTIONAL, -- Need R

csi-SSB-ResourceSetExt INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfigExt) OPTIONAL -- Need R

]],

[[

resourcesForChannelTDCP-r18 SEQUENCE {

resourceSet2TDCP-r18 INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),

resourceSet3TDCP-r18 INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig) OPTIONAL -- Need R

} OPTIONAL, -- Cond TDCP

applyIndicatedTCI-State-r18 CHOICE {

perSet-r18 ENUMERATED {first, second},

perResource-r18 SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF ENUMERATED {first, second}

} OPTIONAL, -- Cond ApplyIndicatedTCI

applyIndicatedTCI-State2-r18 CHOICE {

perSet-r18 ENUMERATED {first, second},

perResource-r18 SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF ENUMERATED {first, second}

} OPTIONAL, -- Cond SecondCSICMR

csi-ReportSubConfigTriggerList-r18 CSI-ReportSubConfigTriggerList-r18 OPTIONAL -- Need R

]]

}

-- TAG-CSI-APERIODICTRIGGERSTATELIST-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-AperiodicTriggerState field descriptions* |
| ***ltm-AssociatedReportConfigInfo***  This field configures the aperiodic CSI reports of LTM candidate cells. If *ltm-associatedReportConfigInfo* is configured the UE shall ignore the field *associatedReportConfigInfoList*. |

|  |
| --- |
| *CSI-AssociatedReportConfigInfo* field descriptions |
| ***ap-CSI-MultiplexingMode***  Indicates if the behavior of transmitting aperiodic CSI on the first PUSCH repetitions corresponding to two SRS resource sets configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage '*codebook*' or '*noncodebook*' is enabled or not. |
| ***applyIndicatedTCI-State,*** ***applyIndicatedTCI-State2***  This field indicates, for an aperiodic CSI-RS resource set (perSet) or for CSI-RS resource (perResource), if UE applies the first or the second "indicated" DL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.2.1.5.1. The *applyIndicatedTCI-State* is for *ResourcesForChannel*, and *applyIndicatedTCI-State2* is for *ResourcesForChannels2.* When *applyIndicatedTCI-State* and *applyIndicatedTCI-State2* are absent, the UE shall use *qcl-info* for *ResourcesForChannel* and use *qcl-info2* for *ResourcesForChannel2.* |
| ***csi-IM-ResourcesForInterference***  *CSI-IM-ResourceSet* for interference measurement. Entry number in csi-IM-ResourceSetList in the *CSI-ResourceConfig* indicated by *csi-IM-ResourcesForInterference* in the *CSI-ReportConfig* indicated by *reportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on). The indicated *CSI-IM-ResourceSet* should have exactly the same number of resources like the *NZP-CSI-RS-ResourceSet* indicated in *resourceSet* within *nzp-CSI-RS*. |
| ***csi-ReportSubConfigTriggerList***  A list of sub-configuration ID(s) of N sub-configurations out of L configured sub-configurations within a *CSI-ReportConfig* associated with a triggering state for aperiodic CSI reporting on PUSCH. |
| ***csi-SSB-ResourceSet,*** ***csi-SSB-ResourceSet2***  CSI-SSB-ResourceSet for channel measurements. Entry number in *csi-SSB-ResourceSetList* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement* in the *CSI-ReportConfig* indicated by *reportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on). |
| ***nzp-CSI-RS-ResourcesForInterference***  *NZP-CSI-RS-ResourceSet* for interference measurement. Entry number in *nzp-CSI-RS-ResourceSetList* in the *CSI-ResourceConfig* indicated by *nzp-CSI-RS-ResourcesForInterference* in the *CSI-ReportConfig* indicated by *reportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on). |
| ***qcl-info, qcl-info2***  List of references to TCI-States for providing the QCL source and QCL type for each *NZP-CSI-RS-Resource* listed in *nzp-CSI-RS-Resources* of the *NZP-CSI-RS-ResourceSet* indicated by *resourceSet* within *nzp-CSI-RS*. Each *TCI-StateId* refers to the *TCI-State* which has this value for *tci-StateId* and is defined in *tci-StatesToAddModList* or in *dl-OrJointTCI-StateList* in the *PDSCH-Config* included in the *BWP-Downlink* corresponding to the serving cell and to the DL BWP to which the *resourcesForChannelMeasuremen*t (in the *CSI-ReportConfig* indicated by *reportConfigId* above) belong to. First entry in *qcl-info* corresponds to first entry in *nzp-CSI-RS-Resources* of that *NZP-CSI-RS-ResourceSet*, second entry in *qcl-info* corresponds to second entry in *nzp-CSI-RS-Resources*, and so on (see TS 38.214 [19], clause 5.2.1.5.1). When this field is absent for aperiodic CSI RS, and *applyIndicatedTCI-State* or *applyIndicatedTCI-State2* is not configured, the UE shall use QCL information included in the "indicated" DL only/Joint TCI state as specified in TS 38.214 [19]. |
| ***reportConfigId***  The *reportConfigId* of one of the *CSI-ReportConfigToAddMod* configured in *CSI-MeasConfig* |
| ***resourcesForChannel2***  Configures reference signals for channel measurement corresponding to the second resource set for L1-RSRP measurement as configured in IE *CSI-ResourceConfig* when *nrofReportedGroups-r17* is configured in IE *CSI-ReportConfig*. If this is present, network configures csi-SSB-ResourceSetExt instead of csi-SSB-ResourceSet and the UE ignores csi-SSB-ResourceSet in resourcesForChannel, and the *resourcesForChannel* configures the reference signals for channel measurement corresponding to the first resource set for L1-RSRP measurement (see TS 38.214 [19], clause 5.2.1.4). |
| ***resourcesForChannelTDCP***  Configures reference signals for channel measurement corresponding to the second resource set and third resource set for TDCP reporting. All CSI resources of these two resource sets always share the same QCL-info with the resource sets indicated by *resourcesForChannel* as spcified in TS 38.214 [19]. |
| ***resourceSet***  *NZP-CSI-RS-ResourceSet* for channel measurements. Entry number in *nzp-CSI-RS-ResourceSetList* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement* in the *CSI-ReportConfig* indicated by r*eportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on). |

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| --- | --- |
| Conditional Presence | Explanation |
| *Aperiodic* | The field is mandatory present if the *NZP-CSI-RS-Resources* in the associated *resourceSet* have the resourceType aperiodic and *unifiedTCI-StateType* is not configured. The field is optionally present, Need R, if the *NZP-CSI-RS-Resources* in the associated *resourceSet* have the *resourceType* aperiodic and *unifiedTCI-StateType* is configured. The field is absent otherwise. |
| *ApplyIndicatedTCI* | The field is optionally present, need R, if *resourceForChannel* has aperiodic CSI-RS and *unifiedTCI-StateType* is configured. This field is absent otherwise. |
| *CSI-IM-ForInterference* | This field is mandatory present if the *CSI-ReportConfig* identified by *reportConfigId* is configured with *csi-IM-ResourcesForInterference*; otherwise it is absent. |
| *NZP-CSI-RS-ForInterference* | This field is mandatory present if the *CSI-ReportConfig* identified by *reportConfigId* is configured with *nzp-CSI-RS-ResourcesForInterference*; otherwise it is absent. |
| *SecondCSICMR* | This field is mandatory present if *resourcesForChannel2* is configured with aperiodic CSI-RS and *applyIndicatedTCI-State* is configured. It is absent otherwise. |
| *TDCP* | This field is absent if *resourcesForChannel2* is configured. It is optionally present, Need R, otherwise. |

#### – *CSI-FrequencyOccupation*

The IE *CSI-FrequencyOccupation* is used to configure the frequency domain occupation of a channel state information measurement resource (e.g. *NZP-CSI-RS-Resource*, *CSI-IM-Resource*).

*CSI-FrequencyOccupation* information element

-- ASN1START

-- TAG-CSI-FREQUENCYOCCUPATION-START

CSI-FrequencyOccupation ::= SEQUENCE {

startingRB INTEGER (0..maxNrofPhysicalResourceBlocks-1),

nrofRBs INTEGER (24..maxNrofPhysicalResourceBlocksPlus1),

...

}

-- TAG-CSI-FREQUENCYOCCUPATION-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-FrequencyOccupation* field descriptions |
| ***nrofRBs***  Number of PRBs across which this CSI resource spans. Only multiples of 4 are allowed. The smallest configurable number is the minimum of 24 and the width of the associated BWP. If the configured value is larger than the width of the corresponding BWP, the UE shall assume that the actual CSI-RS bandwidth is equal to the width of the BWP. |
| ***startingRB***  PRB where this CSI resource starts in relation to common resource block #0 (CRB#0) on the common resource block grid. Only multiples of 4 are allowed (0, 4, ...) |

#### – *CSI-IM-Resource*

The IE *CSI-IM-Resource* is used to configure one CSI Interference Management (IM) resource.

*CSI-IM-Resource* information element

-- ASN1START

-- TAG-CSI-IM-RESOURCE-START

CSI-IM-Resource ::= SEQUENCE {

csi-IM-ResourceId CSI-IM-ResourceId,

csi-IM-ResourceElementPattern CHOICE {

pattern0 SEQUENCE {

subcarrierLocation-p0 ENUMERATED { s0, s2, s4, s6, s8, s10 },

symbolLocation-p0 INTEGER (0..12)

},

pattern1 SEQUENCE {

subcarrierLocation-p1 ENUMERATED { s0, s4, s8 },

symbolLocation-p1 INTEGER (0..13)

}

} OPTIONAL, -- Need M

freqBand CSI-FrequencyOccupation OPTIONAL, -- Need M

periodicityAndOffset CSI-ResourcePeriodicityAndOffset OPTIONAL, -- Cond PeriodicOrSemiPersistent

...

}

-- TAG-CSI-IM-RESOURCE-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-IM-Resource* field descriptions |
| ***csi-IM-ResourceElementPattern***  The resource element pattern (Pattern0 (2,2) or Pattern1 (4,1)) with corresponding parameters (see TS 38.214 [19], clause 5.2.2.4) |
| ***freqBand***  Frequency-occupancy of CSI-IM (see TS 38.214 [19], clause 5.2.2.4) |
| ***periodicityAndOffset***  Periodicity and slot offset for periodic/semi-persistent CSI-IM. Network always configures the UE with a value for this field for periodic and semi-persistent CSI-IM-Resources (as indicated in CSI-ResourceConfig). A change of configuration between periodic or semi-persistent and aperiodic for a CSI-IM-Resource is not supported without a release and add. |
| ***subcarrierLocation-p0***  OFDM subcarrier occupancy of the CSI-IM resource for Pattern0 (see TS 38.214 [19], clause 5.2.2.4) |
| ***subcarrierLocation-p1***  OFDM subcarrier occupancy of the CSI-IM resource for Pattern1 (see TS 38.214 [19], clause 5.2.2.4) |
| ***symbolLocation-p0***  OFDM symbol location of the CSI-IM resource for Pattern0 (see TS 38.214 [19], clause 5.2.2.4) |
| ***symbolLocation-p1***  OFDM symbol location of the CSI-IM resource for Pattern1 (see TS 38.214 [19], clause 5.2.2.4) |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *PeriodicOrSemiPersistent* | The field is optionally present, Need M, for periodic and semi-persistent CSI-IM-Resources (as indicated in CSI-ResourceConfig). The field is absent otherwise. |

#### – *CSI-IM-ResourceId*

The IE *CSI-IM-ResourceId* is used to identify one *CSI-IM-Resource*.

*CSI-IM-ResourceId* information element

-- ASN1START

-- TAG-CSI-IM-RESOURCEID-START

CSI-IM-ResourceId ::= INTEGER (0..maxNrofCSI-IM-Resources-1)

-- TAG-CSI-IM-RESOURCEID-STOP

-- ASN1STOP

#### – *CSI-IM-ResourceSet*

The IE *CSI-IM-ResourceSet* is used to configure a set of one or more CSI Interference Management (IM) resources (their IDs) and set-specific parameters.

*CSI-IM-ResourceSet* information element

-- ASN1START

-- TAG-CSI-IM-RESOURCESET-START

CSI-IM-ResourceSet ::= SEQUENCE {

csi-IM-ResourceSetId CSI-IM-ResourceSetId,

csi-IM-Resources SEQUENCE (SIZE(1..maxNrofCSI-IM-ResourcesPerSet)) OF CSI-IM-ResourceId,

...

}

-- TAG-CSI-IM-RESOURCESET-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-IM-ResourceSet* field descriptions |
| ***csi-IM-Resources***  *CSI-IM-Resources* associated with this *CSI-IM-ResourceSet* (see TS 38.214 [19], clause 5.2). |

#### – *CSI-IM-ResourceSetId*

The IE *CSI-IM-ResourceSetId* is used to identify *CSI-IM-ResourceSet*s.

*CSI-IM-ResourceSetId* information element

-- ASN1START

-- TAG-CSI-IM-RESOURCESETID-START

CSI-IM-ResourceSetId ::= INTEGER (0..maxNrofCSI-IM-ResourceSets-1)

-- TAG-CSI-IM-RESOURCESETID-STOP

-- ASN1STOP

#### – *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

...,

[[

reportTriggerSizeDCI-0-2-r16 INTEGER (0..6) OPTIONAL -- Need R

]],

[[

sCellActivationRS-ConfigToAddModList-r17 SEQUENCE (SIZE (1..maxNrofSCellActRS-r17)) OF SCellActivationRS-Config-r17 OPTIONAL, -- Need N

sCellActivationRS-ConfigToReleaseList-r17 SEQUENCE (SIZE (1..maxNrofSCellActRS-r17)) OF SCellActivationRS-ConfigId-r17 OPTIONAL -- Need N

]],

[[

ltm-CSI-ReportConfigToAddModList-r18 SEQUENCE (SIZE (1..maxNrofLTM-CSI-ReportConfigurations-r18)) OF LTM-CSI-ReportConfig-r18

OPTIONAL, -- Need N

ltm-CSI-ReportConfigToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofLTM-CSI-ReportConfigurations-r18)) OF LTM-CSI-ReportConfigId-r18

OPTIONAL -- Need N

]]

}

-- 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*. |
| ***ltm-CSI-ReportConfigToAddModList***  Configured CSI report settings for LTM as specified in TS 38.214 [19]. |
| ***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, reportTriggerSizeDCI-0-2***  Size of CSI request field in DCI (bits) (see TS 38.214 [19], clause 5.2.1.5.1). The field *reportTriggerSize* applies to DCI format 0\_1 and the field *reportTriggerSizeDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 5.2.1.5.1). |
| ***scellActivationRS-ConfigToAddModList***  Configured RS for fast SCell activation as specified in TS 38.214 [19] clause 5.2.1.5.3. |

#### – *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, table4-r17} 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-v1610 SEQUENCE {

reportSlotOffsetListDCI-0-2-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32) OPTIONAL, -- Need R

reportSlotOffsetListDCI-0-1-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32) OPTIONAL -- Need R

} OPTIONAL, -- Need R

aperiodic-v1610 SEQUENCE {

reportSlotOffsetListDCI-0-2-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32) OPTIONAL, -- Need R

reportSlotOffsetListDCI-0-1-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

codebookConfig-r16 CodebookConfig-r16 OPTIONAL -- Need R

]],

[[

cqi-BitsPerSubband-r17 ENUMERATED {bits4} OPTIONAL, -- Need R

groupBasedBeamReporting-v1710 SEQUENCE {

nrofReportedGroups-r17 ENUMERATED {n1, n2, n3, n4}

} OPTIONAL, -- Need R

codebookConfig-r17 CodebookConfig-r17 OPTIONAL, -- Need R

sharedCMR-r17 ENUMERATED {enable} OPTIONAL, -- Need R

csi-ReportMode-r17 ENUMERATED {mode1, mode2} OPTIONAL, -- Need R

numberOfSingleTRP-CSI-Mode1-r17 ENUMERATED {n0, n1, n2} OPTIONAL, -- Need R

reportQuantity-r17 CHOICE {

cri-RSRP-Index-r17 NULL,

ssb-Index-RSRP-Index-r17 NULL,

cri-SINR-Index-r17 NULL,

ssb-Index-SINR-Index-r17 NULL

} OPTIONAL -- Need R

]],

[[

semiPersistentOnPUSCH-v1720 SEQUENCE {

reportSlotOffsetList-r17 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL, -- Need R

reportSlotOffsetListDCI-0-2-r17 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL, -- Need R

reportSlotOffsetListDCI-0-1-r17 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL -- Need R

} OPTIONAL, -- Need R

aperiodic-v1720 SEQUENCE {

reportSlotOffsetList-r17 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL, -- Need R

reportSlotOffsetListDCI-0-2-r17 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL, -- Need R

reportSlotOffsetListDCI-0-1-r17 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL -- Need R

} OPTIONAL -- Need R

]],

[[

codebookConfig-v1730 CodebookConfig-v1730 OPTIONAL -- Need R

]],

[[

groupBasedBeamReporting-v1800 SEQUENCE {

reportingMode-r18 ENUMERATED {jointULDL, onlyUL}

} OPTIONAL, -- Need R

reportQuantity-r18 TDCP-r18 OPTIONAL, -- Need R

codebookConfig-r18 CodebookConfig-r18 OPTIONAL, -- Need R

csi-ReportSubConfigToAddModList-r18 SEQUENCE (SIZE (1..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-r18)) OF CSI-ReportSubConfig-r18

OPTIONAL, -- Need N

csi-ReportSubConfigToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-r18)) OF CSI-ReportSubConfigId-r18

OPTIONAL -- Need N

]]

}

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)

}

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)

TDCP-r18 ::= SEQUENCE {

delayDSetofLengthY-r18 SEQUENCE (SIZE (1.. maxNrofdelayD-r18)) OF DelayD,

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

}

DelayD ::= ENUMERATED { symb4, slot1, slot2, slot3, slot4, slot5, slot6, slot10 }

CSI-ReportSubConfig-r18 ::= SEQUENCE {

reportSubConfigId-r18 CSI-ReportSubConfigId-r18,

reportSubConfigParams-r18 CHOICE {

a1-parameters SEQUENCE {

codebookSubConfig-r18 CodebookConfig OPTIONAL, -- Need R

portSubsetIndicator-r18 CHOICE {

p2 BIT STRING (SIZE (2)),

p4 BIT STRING (SIZE (4)),

p8 BIT STRING (SIZE (8)),

p12 BIT STRING (SIZE (12)),

p16 BIT STRING (SIZE (16)),

p24 BIT STRING (SIZE (24)),

p32 BIT STRING (SIZE (32))

} OPTIONAL, -- Need R

non-PMI-PortIndication-r18 SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerConfig)) OF PortIndexFor8Ranks

OPTIONAL -- Need R

},

a2-parameters SEQUENCE {

nzp-CSI-RS-ResourceList-r18 SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerSet)) OF NZP-CSI-RS-ResourceIndex-r18

}

} OPTIONAL, -- Need R

powerOffset-r18 INTEGER(0..23) OPTIONAL -- Need R

}

NZP-CSI-RS-ResourceIndex-r18 ::= INTEGER (0..maxNrofNZP-CSI-RS-ResourcesPerSet-1-r18)

-- 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. Network can only configure one of *codebookConfig*, *codebookConfig-r16* or *codebookConfig-r17* or *codebookConfig-r18* in a *CSI-ReportConfig*. The network includes *codebookConfig-v1730* only if *codebookConfig-r17* is configured. |
| ***cqi-BitsPerSubband***  This field can only be present if *cqi-FormatIndicator* is set to *subbandCQI*. If the field is configured with *bits4*, the UE uses 4-bit sub-band CQI. If the field is not present and *cqi-FormatIndicator* is set to *subbandCQI*, the UE uses 2-bit sub-band differential CQI. |
| ***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). For an (e)RedCap UE, CQI table 2 is only supported if the UE indicates support of 256QAM for PDSCH. |
| ***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 in order of frequency position in the BWP. The right-most bit in the bit string represents the lowest subband with the lowest frequency position 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 (see TS 38.214 [19], clause 5.2.1.4).  NOTE: In TS 38.212 [17] clause 6.3.1.1.2 and TS 38.214 [19] clause 5.2.1.4, only subbands to be reported are numbered, e.g. subband #0 is the subband corresponding to the right-most bit set to 1. |
| ***csi-ReportMode***  Configures the CSI report modes Mode1 or Mode 2 (see TS 38.214 [19], clause 5.2.1.4.2) |
| ***csi-ReportSubConfigToAddModList***  List of CSI-ReportSubConfiguration(s) in a CSI report configuration to add or modify. No simultaneous configuration of *portSubsetIndicator* and a list of *nzp-CSI-RS-resources* in a same CSI report sub-configuration. The number of elements in a list is at least 2. |
| ***csi-ReportSubConfigToReleaseList***  List of CSI-ReportSubConfiguration(s) in a CSI report configuration to release. |
| ***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). If *groupBasedBeamReporting* (without suffix) is set to disabled, *groupBasedBeamReporting-v1710* and *groupBasedBeamReporting-v1800* is absent. |
| ***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. |
| ***nrofReportedGroups***  Number of reported resource groups per CSI-report. Value *n1* means one resource group, *n2* means 2 resource groups, and so on. If *nrofReportedGroups* is configured, the UE ignores groupBasedBeamReporting (without suffix). |
| ***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. |
| ***numberOfSingleTRP-CSI-Mode1***  Configures the number of reported X CSIs when *csi-ReportMode* is set to 'Mode 1' as described in TS 38.214 [19], clause 5.2.1.4.2. The field is present only if csi-ReportMode configures Mode 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,* *reportQuantity-r17 or reportQuantity-r18* is present, UE shall ignore *reportQuantity* (without suffix). Network does not configure *reportQuantity-r17* or *reportQuantity-r18* together with *reportQuantity-r16.* |
| ***reportingMode***  Configures the UE with reporting mode for group based reporting.(see TS 38.214 [19] clause 5.2.1.4). |
| ***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, reportSlotOffsetListDCI-0-1***, ***reportSlotOffsetListDCI-0-2***  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 *reportSlotOffsetListDCI-0-1* applies to DCI format 0\_1 and the field *reportSlotOffsetListDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2.1).  The fields *reportSlotOffsetList-r17*, *reportSlotOffsetListDCI-0-1-r17* and *reportSlotOffsetListDCI-0-2-r17* are only applicable for SCS 480 kHz and 960 kHz and if they are configured, the UE shall ignore the fields *reportSlotOffsetList* (without suffix), *reportSlotOffsetListDCI-0-1* (without suffix) and *reportSlotOffsetListDCI-0-2* (without suffix) for SCS 480 kHz and 960 kHz. |
| ***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*. |
| ***sharedCMR***  Enables sharing of channel measurement resources between different CSI measurement hypotheses when (1) *csi-ReportMode* is set to 'Mode1' and *numberOfSingleTRP-CSI-Mode1* is set to 1 or 2; or (2) *csi-ReportMode* is set to 'Mode2' (see TS 38.214 [19], clause 5.2.1.4.2). |
| ***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). |

|  |
| --- |
| *CSI-ReportSubConfig* field descriptions |
| ***codebookSubConfig***  Applicable codebook parameters for the ports indicated by *portSubsetIndicator*. Applicable value ranges for codebook subset restriction, rank restriction, N1, N2, and Ng and twoTX-CodebookSubsetRestriction follow existing specification according to the *codebookConfig* configured within the *CSI-ReportConfig*, and apply for the number of ports determined by *portSubsetIndicator* (see TS 38.214 [19], clause 5.2.1.4.2). In this field, the network always sets the *codebookType* to *type1*. When *reportQuantity* is set to *'cri-RI-i1-CQI'*, the parameter *typeISinglePanel-codebookSubsetRestriction-i2* is mandatory to be configured in the *codebookSubConfig* for each sub-configuration that includes *portSubsetIndicator*. |
| ***non-PMI-PortIndication***  Port indication for RI/CQI calculation applicable only for non-PMI feedback. The field shall be configured only if the *portSubsetIndicator-r18* is configured.  For each CSI-RS resource in the linked *CSI-ResourceConfig* for channel measurement, a port indication for each rank R, indicating which R ports out of P ports to use within the sub-configuration. P corresponds to the number of bits with value 1 in the bitmap *portSubsetIndicator-r18.* |
| ***nzp-CSI-RS-ResourceList***  List of NZP CSI RS resources for the sub-configuration that is a (sub)set of NZP CSI-RS resource(s) of the CSI-RS resource set for channel measurement associated with the sub-configuration in the CSI report configuration. Value 0 refers to the first NZP CSI RS resource of the CSI-RS resource set, value 1 refers to the second NZP CSI RS resource of the CSI-RS resource set, and so on. |
| ***portSubsetIndicator***  Indicates the (sub)set of CSI-RS antenna ports used for CSI calculation of the sub-configuration. In the bit string, each bit corresponds to an antenna port. When a bit is set to 1, the corresponding port is enabled for CSI calculation corresponding to the sub-configuration. When the bit is set to zero, the corresponding port is not enabled for CSI calcualton corresponding to the sub-configuration. The size of the bit string equals P bits, where P=2/4/8/12/16/24/32 represents the number of ports of the NZP CSI-RS resource(s) in the resource set for channel measurement associated with the *CSI-ReportConfig*. |
| ***powerOffset***  When *powerControlOffset* is configured in a NZP CSI-RS resources indicated by *nzp-CSI-RS-Resources*, the power offset of PDSCH RE to NZP CSI-RS RE is equal to *powerControlOffset* - *powerOffset*. |
| ***reportSubConfigParams***  Indicates the resources to be used for the CSI report sub-configuration, which includes either *a1-parameters* that contain the antenna port subset and the associated parameters relevant to the sub-configuration or *a2-parameters* that contain the list of NZP CSI-RS resources for the sub-configuration (see TS 38.214 [19], clause 5.2.1.4.2). |

|  |
| --- |
| *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. |

|  |
| --- |
| *TDCP* field descriptions |
| ***delayDSetofLengthY***  Configures a set of Y delay values for TDCP reporting, see reference TS 38.214 clause 5.2.1.4. The *symb4* denotes 4 symbols, the *slot1* denotes 1 slot, the *slot2* denotes 2 slots and so on. The value *slot10* is applicable only to SCS >=30kHz. The parameter Y, see reference TS38.214 clause 5.2.1.4, is given by the length of the set of D values. |
| ***phaseReporting***  Configures the UE for phase reporting for TDCP reporting see reference TS 38.214 clause 5.2.1.4 |

#### – *CSI-ReportConfigId*

The IE *CSI-ReportConfigId* is used to identify one *CSI-ReportConfig*.

*CSI-ReportConfigId* information element

-- ASN1START

-- TAG-CSI-REPORTCONFIGID-START

CSI-ReportConfigId ::= INTEGER (0..maxNrofCSI-ReportConfigurations-1)

-- TAG-CSI-REPORTCONFIGID-STOP

-- ASN1STOP

#### – *CSI-ReportSubConfigId*

The IE *CSI-ReportSubConfigId* is used to indicate the index of one *CSI-ReportSubConfig* within a CSI report configuration.

*CSI-ReportSubConfigId* information element

-- ASN1START

-- TAG-CSI-REPORTSUBCONFIGID-START

CSI-ReportSubConfigId-r18 ::= INTEGER (0..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-1-r18)

-- TAG-CSI-REPORTSUBCONFIGID-STOP

-- ASN1STOP

#### – *CSI-ReportSubConfigTriggerList*

The IE *CSI-ReportSubConfigTriggerList* is used to configure a list of sub-configuration ID(s) of N sub-configurations out of L configured sub-configurations within a CSI-ReportConfig associated with a triggering state for semi-persistent CSI reporting on PUSCH and aperiodic CSI reporting.

*CSI-ReportSubConfigTriggerList* information element

-- ASN1START

-- TAG-CSI-REPORTSUBCONFIGTRIGGERLIST-START

CSI-ReportSubConfigTriggerList-r18 ::= SEQUENCE (SIZE(1..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-r18)) OF CSI-ReportSubConfigId-r18

-- TAG-CSI-REPORTSUBCONFIGTRIGGERLIST-STOP

-- ASN1STOP

#### – *CSI-ResourceConfig*

The IE *CSI-ResourceConfig* defines a group of one or more *NZP-CSI-RS-ResourceSet*, *CSI-IM-ResourceSet* and/or *CSI-SSB-ResourceSet*.

*CSI-ResourceConfig* information element

-- ASN1START

-- TAG-CSI-RESOURCECONFIG-START

CSI-ResourceConfig ::= SEQUENCE {

csi-ResourceConfigId CSI-ResourceConfigId,

csi-RS-ResourceSetList CHOICE {

nzp-CSI-RS-SSB SEQUENCE {

nzp-CSI-RS-ResourceSetList SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig)) OF NZP-CSI-RS-ResourceSetId

OPTIONAL, -- Need R

csi-SSB-ResourceSetList SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSetsPerConfig)) OF CSI-SSB-ResourceSetId OPTIONAL -- Need R

},

csi-IM-ResourceSetList SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSetsPerConfig)) OF CSI-IM-ResourceSetId

},

bwp-Id BWP-Id,

resourceType ENUMERATED { aperiodic, semiPersistent, periodic },

...,

[[

csi-SSB-ResourceSetListExt-r17 CSI-SSB-ResourceSetId OPTIONAL -- Need R

]]

}

-- TAG-CSI-RESOURCECONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-ResourceConfig* field descriptions |
| ***bwp-Id***  The DL BWP which the CSI-RS associated with this *CSI-ResourceConfig* are located in (see TS 38.214 [19], clause 5.2.1.2. |
| ***csi-IM-ResourceSetList***  List of references to CSI-IM resources used for CSI measurement and reporting in a CSI-RS resource set. Contains up to *maxNrofCSI-IM-ResourceSetsPerConfig* resource sets if *resourceType* is 'aperiodic' and 1 otherwise (see TS 38.214 [19], clause 5.2.1.2). |
| ***csi-ResourceConfigId***  Used in *CSI-ReportConfig* to refer to an instance of *CSI-ResourceConfig.* |
| ***csi-SSB-ResourceSetList, csi-SSB-ResourceSetListExt***  List of references to SSB resources used for CSI measurement and reporting in a CSI-RS resource set (see TS 38.214 [19], clause 5.2.1.2). The *csi-SSB-ResourceSetListExt* provides additional references and can only be configured if *csi-SSB-ResourceSetList* is configured and *groupBasedBeamReporting-v1710* is configured in the *CSI-ReportConfig* that indicates this *CSI-ResourceConfig* as *resourcesForChannelMeasurement*. If *groupBasedBeamReporting-v1710* is configured in the IE *CSI-ReportConfig* that indicates this *CSI-ResourceConfig* as *resourceForChannelMeasurement*, the network configures 2 resource sets, which may be two CSI SSB resource sets (see TS 38.214 [19], clause 5.2.1.2 and 5.2.1.4.2). In this case, in TS 38.212 [17] Table 6.3.1.1.2-8B, the first resource set is indicated by a resource set indicator set to 0 and the second resource set by a resource set indicator set to 1. |
| ***nzp-CSI-RS-ResourceSetList***  List of references to NZP CSI-RS resources used for beam measurement and reporting in a CSI-RS resource set.  If *resourceType* is set to 'aperiodic', the network configures up to *maxNrofNZP-CSI-RS-ResourceSetsPerConfig* resource sets. If *resourceType* is is set to 'periodic' or 'semiPersistent' and *groupBasedBeamReporting-v1710* is not configured in IE *CSI-ReportConfig*, the network configures 1 resource set. If *resourceType* is set to 'periodic' or 'semiPersistent' and *groupBasedBeamReporting-v1710* is configured, the network configures 2 resource sets, which may be two NZP CSI-RS resource sets (see TS 38.214 [19], clause 5.2.1.2 and 5.2.1.4.2). In this case, in TS 38.212 [17] Table 6.3.1.1.2-8B, the first resource set is indicated by a resource set indicator set to 0 and the second resource set by a resource set indicator set to 1. If *resourceType* is set to 'periodic' and *reportQuantity* is set to 'TDCP', the network configures up to 3 resource sets, see TS 38.214 [19] clause 5.2.1.2. |
| ***resourceType***  Time domain behavior of resource configuration (see TS 38.214 [19], clause 5.2.1.2). It does not apply to resources provided in the *csi-SSB-ResourceSetList*. |

#### – *CSI-ResourceConfigId*

The IE *CSI-ResourceConfigId* is used to identify a *CSI-ResourceConfig*.

*CSI-ResourceConfigId* information element

-- ASN1START

-- TAG-CSI-RESOURCECONFIGID-START

CSI-ResourceConfigId ::= INTEGER (0..maxNrofCSI-ResourceConfigurations-1)

-- TAG-CSI-RESOURCECONFIGID-STOP

-- ASN1STOP

#### – *CSI-ResourcePeriodicityAndOffset*

The IE *CSI-ResourcePeriodicityAndOffset* is used to configure a periodicity and a corresponding offset for periodic and semi-persistent CSI resources, and for periodic and semi-persistent reporting on PUCCH. both, the periodicity and the offset are given in number of slots. The periodicity value *slots4* corresponds to 4 slots, value *slots5* corresponds to 5 slots, and so on.

*CSI-ResourcePeriodicityAndOffset* information element

-- ASN1START

-- TAG-CSI-RESOURCEPERIODICITYANDOFFSET-START

CSI-ResourcePeriodicityAndOffset ::= 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),

slots32 INTEGER (0..31),

slots40 INTEGER (0..39),

slots64 INTEGER (0..63),

slots80 INTEGER (0..79),

slots160 INTEGER (0..159),

slots320 INTEGER (0..319),

slots640 INTEGER (0..639)

}

-- TAG-CSI-RESOURCEPERIODICITYANDOFFSET-STOP

-- ASN1STOP

#### – *CSI-RS-ResourceConfigMobility*

The IE *CSI-RS-ResourceConfigMobility* is used to configure CSI-RS based RRM measurements.

*CSI-RS-ResourceConfigMobility* information element

-- ASN1START

-- TAG-CSI-RS-RESOURCECONFIGMOBILITY-START

CSI-RS-ResourceConfigMobility ::= SEQUENCE {

subcarrierSpacing SubcarrierSpacing,

csi-RS-CellList-Mobility SEQUENCE (SIZE (1..maxNrofCSI-RS-CellsRRM)) OF CSI-RS-CellMobility,

...,

[[

refServCellIndex ServCellIndex OPTIONAL -- Need S

]]

}

CSI-RS-CellMobility ::= SEQUENCE {

cellId PhysCellId,

csi-rs-MeasurementBW SEQUENCE {

nrofPRBs ENUMERATED { size24, size48, size96, size192, size264},

startPRB INTEGER(0..2169)

},

density ENUMERATED {d1,d3} OPTIONAL, -- Need R

csi-rs-ResourceList-Mobility SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesRRM)) OF CSI-RS-Resource-Mobility

}

CSI-RS-Resource-Mobility ::= SEQUENCE {

csi-RS-Index CSI-RS-Index,

slotConfig CHOICE {

ms4 INTEGER (0..31),

ms5 INTEGER (0..39),

ms10 INTEGER (0..79),

ms20 INTEGER (0..159),

ms40 INTEGER (0..319)

},

associatedSSB SEQUENCE {

ssb-Index SSB-Index,

isQuasiColocated BOOLEAN

} OPTIONAL, -- Need R

frequencyDomainAllocation CHOICE {

row1 BIT STRING (SIZE (4)),

row2 BIT STRING (SIZE (12))

},

firstOFDMSymbolInTimeDomain INTEGER (0..13),

sequenceGenerationConfig INTEGER (0..1023),

...,

[[

slotConfig-r17 CHOICE {

ms4 INTEGER (0..255),

ms5 INTEGER (0..319),

ms10 INTEGER (0..639),

ms20 INTEGER (0..1279),

ms40 INTEGER (0..2559)

} OPTIONAL -- Need R

]]

}

CSI-RS-Index ::= INTEGER (0..maxNrofCSI-RS-ResourcesRRM-1)

-- TAG-CSI-RS-RESOURCECONFIGMOBILITY-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-RS-CellMobility* field descriptions |
| ***csi-rs-ResourceList-Mobility***  List of CSI-RS resources for mobility. The maximum number of CSI-RS resources that can be configured per *measObjectNR* depends on the configuration of *associatedSSB* and the support of *increasedNumberofCSIRSPerMO* capability (see TS 38.214 [19], clause 5.1.6.1.3). |
| ***density***  Frequency domain density for the 1-port CSI-RS for L3 mobility. See TS 38.211 [16], clause 7.4.1. |
| ***nrofPRBs***  Allowed size of the measurement BW in PRBs. See TS 38.211 [16], clause 7.4.1. |
| ***startPRB***  Starting PRB index of the measurement bandwidth. See TS 38.211 [16], clause 7.4.1. |

|  |
| --- |
| *CSI-RS-ResourceConfigMobility* field descriptions |
| ***csi-RS-CellList-Mobility***  List of cells for CSI-RS based RRM measurements. |
| ***refServCellIndex***  Indicates the serving cell providing the timing reference for CSI-RS resources without *associatedSSB*. The field may be present only if there is at least one CSI-RS resource configured without *associatedSSB*. If this field is absent, the UE shall use the timing of the PCell for measurements on the CSI-RS resources without *associatedSSB*. The CSI-RS resources and the serving cell indicated by *refServCellIndex* for timing reference should be located in the same band. |
| ***subcarrierSpacing***  Subcarrier spacing of CSI-RS.  Only the following values are applicable depending on the used frequency:  FR1: 15, 30, or 60 kHz  FR2-1: 60 or 120 kHz  FR2-2: 120, 480, or 960 kHz |

|  |
| --- |
| *CSI-RS-Resource-Mobility* field descriptions |
| ***associatedSSB***  If this field is present, the UE may base the timing of the CSI-RS resource indicated in *CSI-RS-Resource-Mobility* on the timing of the cell indicated by the *cellId* in the *CSI-RS-CellMobility*. In this case, the UE is not required to monitor that CSI-RS resource if the UE cannot detect the SS/PBCH block indicated by this *associatedSSB* and *cellId*. If this field is absent, the UE shall base the timing of the CSI-RS resource indicated in *CSI-RS-Resource-Mobility* on the timing of the serving cell indicated by *refServCellIndex*. In this case, the UE is required to measure the CSI-RS resource even if SS/PBCH block(s) with *cellId* in the *CSI-RS-CellMobility* are not detected.  CSI-RS resources with and without *associatedSSB* may be configured in accordance with the rules in TS 38.214 [19], clause 5.1.6.1.3. |
| ***csi-RS-Index***  CSI-RS resource index associated to the CSI-RS resource to be measured (and used for reporting). |
| ***firstOFDMSymbolInTimeDomain***  Time domain allocation within a physical resource block. The field indicates the first OFDM symbol in the PRB used for CSI-RS, see TS 38.211 [16], clause 7.4.1.5.3. |
| ***frequencyDomainAllocation***  Frequency domain allocation within a physical resource block in accordance with TS 38.211 [16], clause 7.4.1.5.3 including table 7.4.1.5.2-1. The number of bits that may be set to one depend on the chosen row in that table. |
| ***isQuasiColocated***  Indicates that the CSI-RS resource is quasi co-located with the associated SS/PBCH block, see TS 38.214 [19], clause 5.1.6.1.3. |
| ***sequenceGenerationConfig***  Scrambling ID for CSI-RS (see TS 38.211 [16], clause 7.4.1.5.2). |
| ***slotConfig***  Indicates the CSI-RS periodicity (in milliseconds) and for each periodicity the offset (in number of slots). When *subcarrierSpacing* is set to *kHz15*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 3/4/9/19/39 slots. When *subcarrierSpacing* is set to *kHz30*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 7/9/19/39/79 slots. When *subcarrierSpacing* is set to *kHz60*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 15/19/39/79/159 slots. When *subcarrierSpacing* is set *kHz120*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 31/39/79/159/319 slots. When *subcarrierSpacing* is set to *kHz480*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 127/159/319/639/1279 slots. When *subcarrierSpacing* is set to *kHz960*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 255/319/639/1279/2559 slots. If *slotConfig-r17* is present, UE shall ignore the *slotConfig* (without suffix). |

#### – *CSI-RS-ResourceMapping*

The IE *CSI-RS-ResourceMapping* is used to configure the resource element mapping of a CSI-RS resource in time- and frequency domain.

*CSI-RS-ResourceMapping* information element

-- ASN1START

-- TAG-CSI-RS-RESOURCEMAPPING-START

CSI-RS-ResourceMapping ::= SEQUENCE {

frequencyDomainAllocation CHOICE {

row1 BIT STRING (SIZE (4)),

row2 BIT STRING (SIZE (12)),

row4 BIT STRING (SIZE (3)),

other BIT STRING (SIZE (6))

},

nrofPorts ENUMERATED {p1,p2,p4,p8,p12,p16,p24,p32},

firstOFDMSymbolInTimeDomain INTEGER (0..13),

firstOFDMSymbolInTimeDomain2 INTEGER (2..12) OPTIONAL, -- Need R

cdm-Type ENUMERATED {noCDM, fd-CDM2, cdm4-FD2-TD2, cdm8-FD2-TD4},

density CHOICE {

dot5 ENUMERATED {evenPRBs, oddPRBs},

one NULL,

three NULL,

spare NULL

},

freqBand CSI-FrequencyOccupation,

...

}

-- TAG-CSI-RS-RESOURCEMAPPING-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-RS-ResourceMapping* field descriptions |
| ***cdm-Type***  CDM type (see TS 38.214 [19], clause 5.2.2.3.1). |
| ***density***  Density of CSI-RS resource measured in RE/port/PRB (see TS 38.211 [16], clause 7.4.1.5.3).  Values 0.5 (*dot5*), 1 (*one*) and 3 (*three*) are allowed for X=1, values 0.5 (*dot5*) and 1 (*one*) are allowed for X=2, 16, 24 and 32, value 1 (*one*) is allowed for X=4, 8, 12.  For density = 1/2, includes 1-bit indication for RB level comb offset indicating whether odd or even RBs are occupied by CSI-RS. |
| ***firstOFDMSymbolInTimeDomain2***  Time domain allocation within a physical resource block. See TS 38.211 [16], clause 7.4.1.5.3. |
| ***firstOFDMSymbolInTimeDomain***  Time domain allocation within a physical resource block. The field indicates the first OFDM symbol in the PRB used for CSI-RS. See TS 38.211 [16], clause 7.4.1.5.3. |
| ***freqBand***  Wideband or partial band CSI-RS, (see TS 38.214 [19], clause 5.2.2.3.1). |
| ***frequencyDomainAllocation***  Frequency domain allocation within a physical resource block in accordance with TS 38.211 [16], clause 7.4.1.5.3. The applicable row number in table 7.4.1.5.3-1 is determined by the *frequencyDomainAllocation* for rows 1, 2 and 4, and for other rows by matching the values in the column Ports, Density and CDMtype in table 7.4.1.5.3-1 with the values of *nrofPorts*, *cdm-Type* and density below and, when more than one row has the 3 values matching, by selecting the row where the column (k bar, l bar) in table 7.4.1.5.3-1 has indexes for k ranging from 0 to 2\*n-1 where n is the number of bits set to 1 in *frequencyDomainAllocation*. |
| ***nrofPorts***  Number of ports (see TS 38.214 [19], clause 5.2.2.3.1). |

#### – *CSI-SemiPersistentOnPUSCH-TriggerStateList*

The *CSI-SemiPersistentOnPUSCH-TriggerStateList* IE is used to configure the UE with list of trigger states for semi-persistent reporting of channel state information on L1. See also TS 38.214 [19], clause 5.2.

*CSI-SemiPersistentOnPUSCH-TriggerStateList* information element

-- ASN1START

-- TAG-CSI-SEMIPERSISTENTONPUSCHTRIGGERSTATELIST-START

CSI-SemiPersistentOnPUSCH-TriggerStateList ::= SEQUENCE(SIZE (1..maxNrOfSemiPersistentPUSCH-Triggers)) OF CSI-SemiPersistentOnPUSCH-TriggerState

CSI-SemiPersistentOnPUSCH-TriggerState ::= SEQUENCE {

associatedReportConfigInfo CSI-ReportConfigId,

...,

[[

sp-CSI-MultiplexingMode-r17 ENUMERATED {enabled} OPTIONAL -- Need R

]],

[[

csi-ReportSubConfigTriggerList-r18 CSI-ReportSubConfigTriggerList-r18 OPTIONAL, -- Need R

ltm-AssociatedReportConfigInfo-r18 LTM-CSI-ReportConfigId-r18 OPTIONAL -- Need R

]]

}

-- TAG-CSI-SEMIPERSISTENTONPUSCHTRIGGERSTATELIST-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-SemiPersistentOnPUSCH-TriggerStateList* field descriptions |
| ***csi-ReportSubConfigTriggerList***  A list of sub-configuration ID(s) of N sub-configurations out of L configured sub-configurations within a *CSI-ReportConfig* associated with a triggering state for semi-persistent CSI reporting on PUSCH. |
| ***ltm-AssociatedReportConfigInfo***  This field configures semi-persistent CSI reports on PUSCH of LTM candidate cells. If *ltm-associatedReportConfigInfo* is configured the UE shall ignore the field *associatedReportConfigInfo*. |
| ***sp-CSI-MultiplexingMode***  Indicates if the behavior of transmitting SP-CSI on the first PUSCH repetitions corresponding to two SRS resource sets configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook' is enabled or not. |

#### – *CSI-SSB-ResourceSet*

The IE *CSI-SSB-ResourceSet* is used to configure one SS/PBCH block resource set which refers to SS/PBCH as indicated in *ServingCellConfigCommon* and *ServingCellConfig*.

*CSI-SSB-ResourceSet* information element

-- ASN1START

-- TAG-CSI-SSB-RESOURCESET-START

CSI-SSB-ResourceSet ::= SEQUENCE {

csi-SSB-ResourceSetId CSI-SSB-ResourceSetId,

csi-SSB-ResourceList SEQUENCE (SIZE(1..maxNrofCSI-SSB-ResourcePerSet)) OF SSB-Index,

...,

[[

servingAdditionalPCIList-r17 SEQUENCE (SIZE(1..maxNrofCSI-SSB-ResourcePerSet)) OF ServingAdditionalPCIIndex-r17 OPTIONAL -- Need R

]]

}

ServingAdditionalPCIIndex-r17 ::= INTEGER(0..maxNrofAdditionalPCI-r17)

-- TAG-CSI-SSB-RESOURCESET-STOP

-- ASN1STOP

|  |
| --- |
| *CSI-SSB-ResourceSet* field descriptions |
| ***servingAdditionalPCIList***  Indicates the physical cell IDs (PCI) of the SSBs in the *csi-SSB-ResourceList*. If present, the list has the same number of entries as *csi-SSB-ResourceList*. The first entry of the list indicates the value of the PCI for the first entry of *csi-SSB-ResourceList*, the second entry of this list indicates the value of the PCI for the second entry of *csi-SSB-ResourceList*, and so on. For each entry, the following applies:  - If the value is zero, the PCI is the PCI of the serving cell in which this *CSI-SSB-ResourceSet* is defined;  - otherwise, the value is *additionalPCIIndex-r17* of an *SSB-MTC-AdditionalPCI-r17* configured using the *additionalPCI-ToAddModList-r17* in *ServingCellConfig*, and the PCI is the *additionalPCI-r17* in this *SSB-MTC-AdditionalPCI-r17*. |

#### – *CSI-SSB-ResourceSetId*

The IE *CSI-SSB-ResourceSetId* is used to identify one SS/PBCH block resource set.

*CSI-SSB-ResourceId* information element

-- ASN1START

-- TAG-CSI-SSB-RESOURCESETID-START

CSI-SSB-ResourceSetId ::= INTEGER (0..maxNrofCSI-SSB-ResourceSets-1)

-- TAG-CSI-SSB-RESOURCESETID-STOP

-- ASN1STOP

#### – *DedicatedNAS-Message*

The IE *DedicatedNAS-Message* is used to transfer UE specific NAS layer information between the 5GC CN and the UE. The RRC layer is transparent for this information.

*DedicatedNAS-Message* information element

-- ASN1START

-- TAG-DEDICATED-NAS-MESSAGE-START

DedicatedNAS-Message ::= OCTET STRING

-- TAG-DEDICATED-NAS-MESSAGE-STOP

-- ASN1STOP

#### – *DL-PPW-PreConfig*

The IE *DL-PPW-PreConfig* provides configuration for a measurement window where a UE is expected to measure the DL PRS, if it is inside the active DL BWP and with the same numerology as the active DL BWP. Based upon the indication received in the configuration, the UE identifies whether the DL PRS priority is higher than that of the other DL signals or channels and accordingly determines, for example, the UE is expected to measure the DL PRS and is not expected to receive other DL signals and channels.

*DL-PPW-PreConfig* information element

-- ASN1START

-- TAG-DL-PPW-PRECONFIG-START

DL-PPW-PreConfig-r17 ::= SEQUENCE {

dl-PPW-ID-r17 DL-PPW-ID-r17,

dl-PPW-PeriodicityAndStartSlot-r17 DL-PPW-PeriodicityAndStartSlot-r17,

length-r17 INTEGER (1..160),

type-r17 ENUMERATED {type1A, type1B, type2} OPTIONAL, -- Cond MultiType

priority-r17 ENUMERATED {st1, st2, st3} OPTIONAL -- Cond MultiState

}

DL-PPW-ID-r17 ::= INTEGER (0..maxNrofPPW-ID-1-r17)

DL-PPW-PeriodicityAndStartSlot-r17 ::= CHOICE {

scs15 CHOICE {

n4 INTEGER (0..3),

n5 INTEGER (0..4),

n8 INTEGER (0..7),

n10 INTEGER (0..9),

n16 INTEGER (0..15),

n20 INTEGER (0..19),

n32 INTEGER (0..31),

n40 INTEGER (0..39),

n64 INTEGER (0..63),

n80 INTEGER (0..79),

n160 INTEGER (0..159),

n320 INTEGER (0..319),

n640 INTEGER (0..639),

n1280 INTEGER (0..1279),

n2560 INTEGER (0..2559),

n5120 INTEGER (0..5119),

n10240 INTEGER (0..10239),

...

},

scs30 CHOICE {

n8 INTEGER (0..7),

n10 INTEGER (0..9),

n16 INTEGER (0..15),

n20 INTEGER (0..19),

n32 INTEGER (0..31),

n40 INTEGER (0..39),

n64 INTEGER (0..63),

n80 INTEGER (0..79),

n128 INTEGER (0..127),

n160 INTEGER (0..159),

n320 INTEGER (0..319),

n640 INTEGER (0..639),

n1280 INTEGER (0..1279),

n2560 INTEGER (0..2559),

n5120 INTEGER (0..5119),

n10240 INTEGER (0..10239),

n20480 INTEGER (0..20479),

...

},

scs60 CHOICE {

n16 INTEGER (0..15),

n20 INTEGER (0..19),

n32 INTEGER (0..31),

n40 INTEGER (0..39),

n64 INTEGER (0..63),

n80 INTEGER (0..79),

n128 INTEGER (0..127),

n160 INTEGER (0..159),

n256 INTEGER (0..255),

n320 INTEGER (0..319),

n640 INTEGER (0..639),

n1280 INTEGER (0..1279),

n2560 INTEGER (0..2559),

n5120 INTEGER (0..5119),

n10240 INTEGER (0..10239),

n20480 INTEGER (0..20479),

n40960 INTEGER (0..40959),

...

},

scs120 CHOICE {

n32 INTEGER (0..31),

n40 INTEGER (0..39),

n64 INTEGER (0..63),

n80 INTEGER (0..79),

n128 INTEGER (0..127),

n160 INTEGER (0..159),

n256 INTEGER (0..255),

n320 INTEGER (0..319),

n512 INTEGER (0..511),

n640 INTEGER (0..639),

n1280 INTEGER (0..1279),

n2560 INTEGER (0..2559),

n5120 INTEGER (0..5119),

n10240 INTEGER (0..10239),

n20480 INTEGER (0..20479),

n40960 INTEGER (0..40959),

n81920 INTEGER (0..81919),

...

},

...

}

-- TAG-DL-PPW-PRECONFIG-STOP

-- ASN1STOP

| *DL-PPW-PreConfig* field descriptions |
| --- |
| ***dl-PPW-ID***  Indicates the pre-configured ID for DL-PRS processing window configuration. |
| ***dl-PPW-PeriodicityAndStartSlot***  Indicates the periodicity in slots and the offset of the starting slot with respect to SFN #0 slot #0 of the serving cell where the DL-PRS processing window is configured. |
| ***length***  Indicates the length of DL-PRS processing window in slots. Value 1 indicates *length* of one slot, value 2 indicates *length* of two slots and so on. |
| ***priority***  Indicates the priority between PDCCH/PDSCH/CSI-RS and PRS as specified in TS 38.214 [19]. |
| ***type***  Indicates the DL-PRS processing window type as specified in TS 38.214 [19]. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *MultiType* | The field is mandatory present when the UE reports its capability on supporting multiple processing types, otherwise it is absent. |
| *MultiState* | The field is mandatory present when the UE reports its capability on supporting option 1 or option 2 for the configured type, otherwise it is absent. |

#### – *DMRS-BundlingPUCCH-Config*

The IE *DMRS-BundlingPUCCH-Config-r17* is used to configure DMRS bundling for PUCCH.

*DMRS-BundlingPUCCH-Config* information element

-- ASN1START

-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-START

DMRS-BundlingPUCCH-Config-r17 ::= SEQUENCE {

pucch-DMRS-Bundling-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

pucch-TimeDomainWindowLength-r17 INTEGER (2..8) OPTIONAL, -- Need S

pucch-WindowRestart-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

pucch-FrequencyHoppingInterval-r17 ENUMERATED {s2, s4, s5, s10} OPTIONAL, -- Need S

...

}

-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *DMRS-BundlingPUCCH-Config* field descriptions |
| ***pucch-DMRS-Bundling***  Indicates whether DMRS bundling and time domain window for PUCCH are jointly enabled. |
| ***pucch-FrequencyHoppingInterval***  Configures the number of consecutive slots for the UE to perform inter-slot frequency hopping with inter-slot bundling for PUCCH. When both inter-frequency hopping and DMRS bundling are enabled for PUCCH repetitions, the UE is expected to be configured with at least one *pucch-FrequencyHoppingInterval-r17* and *pucch-TimeDomainWindowLength-r17*. When DMRS bundling for PUCCH is enabled by *pucch-DMRS-Bundling-r17,* PUCCH frequency hopping interval is only determined by the configuration of PUCCH hopping interval if PUCCH hopping interval is configured. If the field is absent, the number of consecutive slots for the UE to perform inter-slot PUCCH frequency hopping is indicated by *pucch-TimeDomainWindowLength-r17.* |
| ***pucch-TimeDomainWindowLength***  Configures the length of a nominal time domain window in slots for DMRS bundling for PUCCH. The value shall not exceed the maximum duration for DMRS bundling for PUCCH as specified in TS 38.306 [26]. If this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the time duration for the transmission of all PUCCH repetitions and the maximum duration for DMRS bundling for PUCCH as specified in TS 38.306 [26]. |
| ***pucch-WindowRestart***  Indicates whether UE bundles PUCCH DMRS remaining in a nominal time domain window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is enabled (see TS 38.214 [19], clause 6.1.7).  NOTE: Events, which are triggered by DCI or MAC CE, but do not require UE capability to resume maintaining power consistency and/or phase continuity as specified in clause 6.1.7 of TS 38.214 [19], are excluded. |

#### – *DMRS-BundlingPUSCH-Config*

The IE *DMRS-BundlingPUSCH-Config-r17* is used to configure DMRS bundling for PUSCH.

*DMRS-BundlingPUSCH-Config* information element

-- ASN1START

-- TAG-DMRS-BUNDLINGPUSCH-CONFIG-START

DMRS-BundlingPUSCH-Config-r17 ::= SEQUENCE {

pusch-DMRS-Bundling-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

pusch-TimeDomainWindowLength-r17 INTEGER (2..32) OPTIONAL, -- Need S

pusch-WindowRestart-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

pusch-FrequencyHoppingInterval-r17 ENUMERATED {s2, s4, s5, s6, s8, s10, s12, s14, s16, s20} OPTIONAL, -- Need S

...

}

-- TAG-DMRS-BUNDLINGPUSCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *DMRS-BundlingPUSCH-Config* field descriptions |
| ***pusch-DMRS-Bundling***  Indicates whether DMRS bundling and time domain window for PUSCH are jointly enabled. |
| ***pusch-FrequencyHoppingInterval***  Configures the number of consecutive slots for the UE to perform inter-slot frequency hopping with inter-slot bundling for PUSCH. When both inter-frequency hopping and DMRS bundling are enabled for PUSCH repetitions, the UE is expected to be configured with at least one *pusch-FrequencyHoppingInterval-r17* and *pusch-TimeDomainWindowLength-r17*. This parameter is shared for both DG-PUSCH and CG-PUSCH. When DMRS bundling for PUSCH is enabled by *pusch-DMRS-Bundling-r17,* PUSCH frequency hopping interval is only determined by the configuration of PUSCH hopping interval if PUSCH hopping interval is configured. If the field is absent, the number of consecutive slots for the UE to perform inter-slot PUSCH frequency hopping is indicated by *pusch-TimeDomainWindowLength-r17.*  Note: For unpaired spectrum, the UE is not expected to be configured the value of s6, s8, s12, s14 and s16. |
| ***pusch-TimeDomainWindowLength***  Configures the length of a nominal time domain window in number of consecutive slots for DMRS bundling for PUSCH. The value shall not exceed the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26]. For PUSCH repetition type A/B, if this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the time duration for the transmission of all PUSCH repetitions and the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26]. For TBoMS, if this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the duration of TBoMS transmission (including repetition of TBoMS) and the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26]. |
| ***pusch-WindowRestart***  Indicates whether UE bundles PUSCH DMRS remaining in a nominal time domain window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is enabled (see TS 38.214 [19], clause 6.1.7).  NOTE: Events, which are triggered by DCI or MAC CE, but do not require UE capability to resume maintaining power consistency and/or phase continuity as specified in clause 6.1.7 of TS 38.214 [19], are excluded. |

#### – *DMRS-DownlinkConfig*

The IE *DMRS-DownlinkConfig* is used to configure downlink demodulation reference signals for PDSCH.

*DMRS-DownlinkConfig* information element

-- ASN1START

-- TAG-DMRS-DOWNLINKCONFIG-START

DMRS-DownlinkConfig ::= SEQUENCE {

dmrs-Type ENUMERATED {type2} OPTIONAL, -- Need S

dmrs-AdditionalPosition ENUMERATED {pos0, pos1, pos3} OPTIONAL, -- Need S

maxLength ENUMERATED {len2} OPTIONAL, -- Need S

scramblingID0 INTEGER (0..65535) OPTIONAL, -- Need S

scramblingID1 INTEGER (0..65535) OPTIONAL, -- Need S

phaseTrackingRS SetupRelease { PTRS-DownlinkConfig } OPTIONAL, -- Need M

...,

[[

dmrs-Downlink-r16 ENUMERATED {enabled} OPTIONAL -- Need R

]],

[[

dmrs-TypeEnh-r18 ENUMERATED {enabled} OPTIONAL -- Need R

]]

}

-- TAG-DMRS-DOWNLINKCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *DMRS-DownlinkConfig* field descriptions |
| ***dmrs-AdditionalPosition***  Position for additional DM-RS in DL, see Tables 7.4.1.1.2-3 and 7.4.1.1.2-4 in TS 38.211 [16]. If the field is absent, the UE applies the value pos2. See also clause 7.4.1.1.2 for additional constraints on how the network may set this field depending on the setting of other fields. |
| ***dmrs-Downlink***  This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 7.4.1.1.1. |
| ***dmrs-Type***  Selection of the DMRS type to be used for DL (see TS 38.211 [16], clause 7.4.1.1.1). If the field is absent, the UE uses DMRS type 1. |
| ***dmrs-TypeEnh***  This field is used in TS 38.211 [16], clause 7.4.1.1.2. |
| ***maxLength***  The maximum number of OFDM symbols for DL front loaded DMRS. *len1* corresponds to value 1. *len2* corresponds to value 2. If the field is absent, the UE applies value *len1*. If set to *len2*, the UE determines the actual number of DM-RS symbols by the associated DCI. (see TS 38.211 [16], clause 7.4.1.1.2). |
| ***phaseTrackingRS***  Configures downlink PTRS. If the field is not configured, the UE assumes that downlink PTRS are absent. See TS 38.214 [19] clause 5.1.6.3. |
| ***scramblingID0***  DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value *physCellId* configured for this serving cell. |
| ***scramblingID1***  DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value *physCellId* configured for this serving cell. |

#### – *DMRS-UplinkConfig*

The IE *DMRS-UplinkConfig* is used to configure uplink demodulation reference signals for PUSCH.

*DMRS-UplinkConfig* information element

-- ASN1START

-- TAG-DMRS-UPLINKCONFIG-START

DMRS-UplinkConfig ::= SEQUENCE {

dmrs-Type ENUMERATED {type2} OPTIONAL, -- Need S

dmrs-AdditionalPosition ENUMERATED {pos0, pos1, pos3} OPTIONAL, -- Need S

phaseTrackingRS SetupRelease { PTRS-UplinkConfig } OPTIONAL, -- Need M

maxLength ENUMERATED {len2} OPTIONAL, -- Need S

transformPrecodingDisabled SEQUENCE {

scramblingID0 INTEGER (0..65535) OPTIONAL, -- Need S

scramblingID1 INTEGER (0..65535) OPTIONAL, -- Need S

...,

[[

dmrs-Uplink-r16 ENUMERATED {enabled} OPTIONAL -- Need R

]]

} OPTIONAL, -- Need R

transformPrecodingEnabled SEQUENCE {

nPUSCH-Identity INTEGER(0..1007) OPTIONAL, -- Need S

sequenceGroupHopping ENUMERATED {disabled} OPTIONAL, -- Need S

sequenceHopping ENUMERATED {enabled} OPTIONAL, -- Need S

...,

[[

dmrs-UplinkTransformPrecoding-r16 SetupRelease {DMRS-UplinkTransformPrecoding-r16} OPTIONAL -- Need M

]]

} OPTIONAL, -- Need R

...,

[[

dmrs-TypeEnh-r18 ENUMERATED {enabled} OPTIONAL -- Need R

]]

}

DMRS-UplinkTransformPrecoding-r16 ::= SEQUENCE {

pi2BPSK-ScramblingID0 INTEGER(0..65535) OPTIONAL, -- Need S

pi2BPSK-ScramblingID1 INTEGER(0..65535) OPTIONAL -- Need S

}

-- TAG-DMRS-UPLINKCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *DMRS-UplinkConfig* field descriptions |
| ***dmrs-AdditionalPosition***  Position for additional DM-RS in UL (see TS 38.211 [16], clause 6.4.1.1.3). If the field is absent, the UE applies the value pos2. See also clause 6.4.1.1.3 for additional constraints on how the network may set this field depending on the setting of other fields. |
| ***dmrs-Type***  Selection of the DMRS type to be used for UL (see TS 38.211 [16], clause 6.4.1.1.3) If the field is absent, the UE uses DMRS type 1. |
| ***dmrs-TypeEnh***  This field is used in TS 38.211 [16], clause 6.4.1.1.3. |
| ***dmrs-Uplink***  This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 6.4.1.1.1.1. |
| ***dmrs-UplinkTransformPrecoding***  This field indicates whether low PAPR DMRS is used for PUSCH with pi/2 BPSK modulation, as specified in TS38.211 [16], clause 6.4.1.1.1.2. The network configures this field only if *tp-pi2BPSK* is configured in *PUSCH-Config*. |
| ***maxLength***  The maximum number of OFDM symbols for UL front loaded DMRS. *len1* corresponds to value 1. *len2* corresponds to value 2. If the field is absent, the UE applies value *len1*. If set to *len2*, the UE determines the actual number of DM-RS symbols by the associated DCI. (see TS 38.211 [16], clause 6.4.1.1.3). |
| ***nPUSCH-Identity***  Parameter: N\_ID^(PUSCH) for DFT-s-OFDM DMRS. If the value is absent or released, the UE uses the value Physical cell ID (*physCellId*). See TS 38.211 [16]. |
| ***phaseTrackingRS***  Configures uplink PTRS (see TS 38.211 [16]). |
| ***pi2BPSK-ScramblingID0, pi2BPSK-ScramblingID1***  UL DMRS scrambling initialization for pi/2 BPSK DMRS for PUSCH (see TS 38.211 [16], Clause 6.4.1.1.2). When the field is absent the UE applies the value Physical cell ID (physCellId) of the serving cell. |
| ***scramblingID0***  UL DMRS scrambling initialization for CP-OFDM (see TS 38.211 [16], clause 6.4.1.1.1.1). When the field is absent the UE applies the value Physical cell ID (*physCellId*). |
| ***scramblingID1***  UL DMRS scrambling initialization for CP-OFDM. (see TS 38.211 [16], clause 6.4.1.1.1.1). When the field is absent the UE applies the value Physical cell ID (*physCellId*). |
| ***sequenceGroupHopping***  For DMRS transmission with transform precoder the NW may configure group hopping by the cell-specific parameter *groupHoppingEnabledTransformPrecoding* in *PUSCH-ConfigCommon*. In this case, the NW may include this UE specific field to disable group hopping for PUSCH transmission except for Msg3, i.e., to override the configuration in *PUSCH-ConfigCommon* (see TS 38.211 [16]). If the field is absent, the UE uses the same hopping mode as for Msg3. |
| ***sequenceHopping***  Determines if sequence hopping is enabled for DMRS transmission with transform precoder for PUSCH transmission other than Msg3 (sequence hopping is always disabled for Msg3). If the field is absent, the UE uses the same hopping mode as for msg3. The network does not configure simultaneous group hopping and sequence hopping. See TS 38.211 [16], clause 6.4.1.1.1.2. |
| ***transformPrecodingDisabled***  DMRS related parameters for Cyclic Prefix OFDM. |
| ***transformPrecodingEnabled***  DMRS related parameters for DFT-s-OFDM (Transform Precoding). |

#### *– DownlinkConfigCommon*

The IE *DownlinkConfigCommon* provides common downlink parameters of a cell.

*DownlinkConfigCommon* information element

-- ASN1START

-- TAG-DOWNLINKCONFIGCOMMON-START

DownlinkConfigCommon ::= SEQUENCE {

frequencyInfoDL FrequencyInfoDL OPTIONAL, -- Cond InterFreqHOAndServCellAdd

initialDownlinkBWP BWP-DownlinkCommon OPTIONAL, -- Cond ServCellAdd

...,

[[

initialDownlinkBWP-RedCap-r17 BWP-DownlinkCommon OPTIONAL -- Need R

]]

}

-- TAG-DOWNLINKCONFIGCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| *DownlinkConfigCommon* field descriptions |
| ***frequencyInfoDL***  Basic parameters of a downlink carrier and transmission thereon. |
| ***initialDownlinkBWP***  The initial downlink BWP configuration for a serving cell. The network configures the *locationAndBandwidth* so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain. |
| ***initialDownlinkBWP-RedCap***  If present, (e)RedCap UEs use this DL BWP instead of *initialDownlinkBWP*.  If absent, (e)RedCap UEs use *initialDownlinkBWP* provided that it does not exceed the (e)RedCap UE maximum bandwidth (see also clause 5.2.2.4.2). |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *InterFreqHOAndServCellAdd* | This field is mandatory present for inter-frequency handover, and upon serving cell (PSCell/SCell) addition. Otherwise, the field is optionally present, Need M. |
| *ServCellAdd* | This field is mandatory present upon serving cell addition (for PSCell and SCell) and upon handover from E-UTRA to NR. It is optionally present, Need M otherwise. |

#### – *DownlinkConfigCommonSIB*

The IE *DownlinkConfigCommonSIB* provides common downlink parameters of a cell.

*DownlinkConfigCommonSIB* information element

-- ASN1START

-- TAG-DOWNLINKCONFIGCOMMONSIB-START

DownlinkConfigCommonSIB ::= SEQUENCE {

frequencyInfoDL FrequencyInfoDL-SIB,

initialDownlinkBWP BWP-DownlinkCommon,

bcch-Config BCCH-Config,

pcch-Config PCCH-Config,

...,

[[

pei-Config-r17 PEI-Config-r17 OPTIONAL, -- Need R

initialDownlinkBWP-RedCap-r17 BWP-DownlinkCommon OPTIONAL -- Need R

]],

[[

frequencyInfoDL-v1800 FrequencyInfoDL-SIB-v1800 OPTIONAL -- Need R

]]

}

DownlinkConfigCommonSIB-v1760 ::= SEQUENCE {

frequencyInfoDL-v1760 FrequencyInfoDL-SIB-v1760

}

BCCH-Config ::= SEQUENCE {

modificationPeriodCoeff ENUMERATED {n2, n4, n8, n16},

...

}

PCCH-Config ::= SEQUENCE {

defaultPagingCycle PagingCycle,

nAndPagingFrameOffset CHOICE {

oneT NULL,

halfT INTEGER (0..1),

quarterT INTEGER (0..3),

oneEighthT INTEGER (0..7),

oneSixteenthT INTEGER (0..15)

},

ns ENUMERATED {four, two, one},

firstPDCCH-MonitoringOccasionOfPO CHOICE {

sCS15KHZoneT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..139),

sCS30KHZoneT-SCS15KHZhalfT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..279),

sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..559),

sCS120KHZoneT-SCS60KHZhalfT-SCS30KHZquarterT-SCS15KHZoneEighthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..1119),

sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZoneEighthT-SCS15KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..2239),

sCS480KHZoneT-SCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..4479),

sCS480KHZhalfT-SCS120KHZoneEighthT-SCS60KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..8959),

sCS480KHZquarterT-SCS120KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..17919)

} OPTIONAL, -- Need R

...,

[[

nrofPDCCH-MonitoringOccasionPerSSB-InPO-r16 INTEGER (2..4) OPTIONAL -- Cond SharedSpectrum2

]],

[[

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

firstPDCCH-MonitoringOccasionOfPO-v1710 CHOICE {

sCS480KHZoneEighthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..35839),

sCS480KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..71679)

} OPTIONAL -- Need R

]]

}

PEI-Config-r17 ::= SEQUENCE {

po-NumPerPEI-r17 ENUMERATED {po1, po2, po4, po8},

payloadSizeDCI-2-7-r17 INTEGER (1..maxDCI-2-7-Size-r17),

pei-FrameOffset-r17 INTEGER (0..16),

subgroupConfig-r17 SubgroupConfig-r17,

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

...

}

SubgroupConfig-r17 ::= SEQUENCE {

subgroupsNumPerPO-r17 INTEGER (1.. maxNrofPagingSubgroups-r17),

subgroupsNumForUEID-r17 INTEGER (1.. maxNrofPagingSubgroups-r17) OPTIONAL, -- Need S

...

}

-- TAG-DOWNLINKCONFIGCOMMONSIB-STOP

-- ASN1STOP

|  |
| --- |
| *DownlinkConfigCommonSIB* field descriptions |
| ***bcch-Config***  The modification period related configuration. |
| ***frequencyInfoDL-SIB***  Basic parameters of a downlink carrier and transmission thereon. |
| ***initialDownlinkBWP***  The initial downlink BWP configuration for a PCell. The network configures the *locationAndBandwidth* so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain. The UE applies the *locationAndBandwidth* upon reception of this field (e.g. to determine the frequency position of signals described in relation to this *locationAndBandwidth*) but it keeps CORESET#0 until after reception of *RRCSetup*/*RRCResume/RRCReestablishment*. |
| ***initialDownlinkBWP-RedCap***  If present, (e)RedCap UEs use this DL BWP instead of *initialDownlinkBWP*. If the *locationAndBandwidth* of this BWP contains the entire CORESET#0, the UE applies the *locationAndBandwidth* upon reception of this field (e.g. to determine the frequency position of signals described in relation to this *locationAndBandwidth*) but it keeps CORESET#0 until after reception of *RRCSetup*/*RRCResume/RRCReestablishment*. Otherwise, i.e., if the *locationAndBandwidth* of this BWP does not contain the entire CORESET#0, the UE uses this BWP for receiving DL messages during initial access (Msg2, MsgB, Msg4) and after initial access.  If absent, (e)RedCap UEs use *initialDownlinkBWP* provided that it does not exceed the (e)RedCap UE maximum bandwidth (see also clause 5.2.2.4.2). |
| ***lastUsedCellOnly***  When present, the field indicates that the UE monitors PEI only if the latest received *RRCRelease* without *noLastCellUpdate* is from this cell. A PEI-capable UE stores its last used cell information. |
| ***nrofPDCCH-MonitoringOccasionPerSSB-InPO***  The number of PDCCH monitoring occasions corresponding to an SSB within a Paging Occasion, see TS 38.304 [20], clause 7.1. |
| ***pcch-Config***  The paging related configuration. |
| ***pei-Config***  The PEI related configuration. |
| ***subgroupConfig***  The paging subgroup related configuration. |

|  |
| --- |
| *BCCH-Config* field descriptions |
| ***modificationPeriodCoeff***  Actual modification period, expressed in number of radio frames m = *modificationPeriodCoeff* \* *defaultPagingCycle*, see clause 5.2.2.2.2. *n2* corresponds to value 2, *n4* corresponds to value 4, and so on. |

|  |
| --- |
| *PCCH-Config* field descriptions |
| ***defaultPagingCycle***  Default paging cycle, used to derive 'T' in TS 38.304 [20]. Value *rf32* corresponds to 32 radio frames, value *rf64* corresponds to 64 radio frames and so on. |
| ***firstPDCCH-MonitoringOccasionOfPO***  Points out the first PDCCH monitoring occasion for paging of each PO of the PF, see TS 38.304 [20]. |
| ***nAndPagingFrameOffset***  Used to derive the number of total paging frames in T (corresponding to parameter N in TS 38.304 [20]) and paging frame offset (corresponding to parameter PF\_offset in TS 38.304 [20]). A value of *oneSixteenthT* corresponds to T / 16, a value of oneEighthT corresponds to T / 8, and so on.  If *pagingSearchSpace* is set to zero and if SS/PBCH block and CORESET multiplexing pattern is 2 or 3 (as specified in TS 38.213 [13]):  - for *ssb-periodicityServingCell* of 5 or 10 ms, N can be set to one of {*oneT, halfT, quarterT, oneEighthT, oneSixteenthT*}  - for *ssb-periodicityServingCell* of 20 ms, N can be set to one of {*halfT, quarterT, oneEighthT, oneSixteenthT*}  - for *ssb-periodicityServingCell* of 40 ms, N can be set to one of {*quarterT, oneEighthT, oneSixteenthT*}  - for *ssb-periodicityServingCell* of 80 ms, N can be set to one of {*oneEighthT, oneSixteenthT*}  - for *ssb-periodicityServingCell* of 160 ms, N can be set to *oneSixteenthT*  If *pagingSearchSpace* is set to zero and if SS/PBCH block and CORESET multiplexing pattern is 1 (as specified in TS 38.213 [13]), N can be set to one of {*halfT, quarterT, oneEighthT, oneSixteenthT*}  If *pagingSearchSpace* is not set to zero, N can be configured to one of {*oneT, halfT, quarterT, oneEighthT, oneSixteenthT*} |
| ***ns***  Number of paging occasions per paging frame. |
| ***ranPagingInIdlePO***  Indicates that the network supports to send RAN paging in PO that corresponds to the i\_s as determined by UE in RRC\_IDLE state, see TS38.304 [20]. |

|  |
| --- |
| *PEI-Config* field descriptions |
| ***payloadSizeDCI-2-7***  Payload size of PEI DCI, i.e., DCI format 2\_7. The size is no larger than the payload size of paging DCI which has maximum of 41 bits and 43 bits for licensed and unlicensed spectrums, respectively. |
| ***pei-FrameOffset***  Offset, in number of frames from the start of a reference frame for PEI-O to the start of a first paging frame of the paging frames associated with the PEI-O, see TS 38.213 [13], clause 10.4A. |
| ***po-NumPerPEI***  The number of PO(s) associated with one PEI monitoring occasion. It is a factor of the total PO number in a paging cycle, i.e N x Ns, as specified in TS 38.304 [20]. The maximum number of PF associated with one PEI monitoring occasion is 2. The number of PO mapping to one PEI should be multiple of Ns when *po-NumPerPEI* is larger than Ns. |

|  |
| --- |
| *SubgroupConfig* field descriptions |
| ***subgroupsNumPerPO***  Total number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling. The field represents the sum of CN-assigned and UEID-based subgroups supported by the network. When *PEI-Config* is configured, there is always at least one subgroup (UEID-based subgroup or CN-assigned subgroup) configured. |
| ***subgroupsNumForUEID***  Number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling, for UEID-based subgrouping method. When present, the fieldis set to an integer smaller than or equal to *subgroupsNumPerPO. subgroupsNumPerPO* equals to *subgroupsNumForUEID* when the network does not configure CN-assigned subgrouping. When *pei-Config* is configured, the field is absent when the network only configures CN-assigned subgrouping. Both this field and *subgroupsNumPerPO* are equal to 1 when the network does not configure subgrouping. When *pei-Config* is configured, if the field is absent, the UE uses subgrouping according to TS 38.304 [20], clause 7.3.0. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *SharedSpectrum2* | The field is optional present, Need R, if this cell operates with shared spectrum channel access. Otherwise, it is absent, Need R. |

#### – *DownlinkPreemption*

The IE *DownlinkPreemption* is used to configure the UE to monitor PDCCH for the INT-RNTI (interruption).

*DownlinkPreemption* information element

-- ASN1START

-- TAG-DOWNLINKPREEMPTION-START

DownlinkPreemption ::= SEQUENCE {

int-RNTI RNTI-Value,

timeFrequencySet ENUMERATED {set0, set1},

dci-PayloadSize INTEGER (0..maxINT-DCI-PayloadSize),

int-ConfigurationPerServingCell SEQUENCE (SIZE (1..maxNrofServingCells)) OF INT-ConfigurationPerServingCell,

...

}

INT-ConfigurationPerServingCell ::= SEQUENCE {

servingCellId ServCellIndex,

positionInDCI INTEGER (0..maxINT-DCI-PayloadSize-1)

}

-- TAG-DOWNLINKPREEMPTION-STOP

-- ASN1STOP

|  |
| --- |
| *DownlinkPreemption* field descriptions |
| ***dci-PayloadSize***  Total length of the DCI payload scrambled with INT-RNTI (see TS 38.213 [13], clause 11.2). |
| ***int-ConfigurationPerServingCell***  Indicates (per serving cell) the position of the 14 bit INT values inside the DCI payload (see TS 38.213 [13], clause 11.2). |
| ***int-RNTI***  RNTI used for indication pre-emption in DL (see TS 38.213 [13], clause 10). |
| ***timeFrequencySet***  Set selection for DL-preemption indication (see TS 38.213 [13], clause 11.2) The set determines how the UE interprets the DL preemption DCI payload. |

|  |
| --- |
| *INT-ConfigurationPerServingCell* field descriptions |
| ***positionInDCI***  Starting position (in number of bit) of the 14 bit INT value applicable for this serving cell (*servingCellId*) within the DCI payload (see TS 38.213 [13], clause 11.2). Must be multiples of 14 (bit). |

#### – *DRB-Identity*

The IE *DRB-Identity* is used to identify a DRB used by a UE.

*DRB-Identity* information element

-- ASN1START

-- TAG-DRB-IDENTITY-START

DRB-Identity ::= INTEGER (1..32)

-- TAG-DRB-IDENTITY-STOP

-- ASN1STOP

#### – *DRX-Config*

The IE *DRX-Config* is used to configure DRX related parameters.

*DRX-Config* information element

-- ASN1START

-- TAG-DRX-CONFIG-START

DRX-Config ::= SEQUENCE {

drx-onDurationTimer CHOICE {

subMilliSeconds INTEGER (1..31),

milliSeconds ENUMERATED {

ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,

ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,

ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 }

},

drx-InactivityTimer ENUMERATED {

ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,

ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,

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

drx-HARQ-RTT-TimerDL INTEGER (0..56),

drx-HARQ-RTT-TimerUL INTEGER (0..56),

drx-RetransmissionTimerDL ENUMERATED {

sl0, sl1, sl2, sl4, sl6, sl8, sl16, sl24, sl33, sl40, sl64, sl80, sl96, sl112, sl128,

sl160, sl320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,

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

drx-RetransmissionTimerUL ENUMERATED {

sl0, sl1, sl2, sl4, sl6, sl8, sl16, sl24, sl33, sl40, sl64, sl80, sl96, sl112, sl128,

sl160, sl320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,

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

drx-LongCycleStartOffset CHOICE {

ms10 INTEGER(0..9),

ms20 INTEGER(0..19),

ms32 INTEGER(0..31),

ms40 INTEGER(0..39),

ms60 INTEGER(0..59),

ms64 INTEGER(0..63),

ms70 INTEGER(0..69),

ms80 INTEGER(0..79),

ms128 INTEGER(0..127),

ms160 INTEGER(0..159),

ms256 INTEGER(0..255),

ms320 INTEGER(0..319),

ms512 INTEGER(0..511),

ms640 INTEGER(0..639),

ms1024 INTEGER(0..1023),

ms1280 INTEGER(0..1279),

ms2048 INTEGER(0..2047),

ms2560 INTEGER(0..2559),

ms5120 INTEGER(0..5119),

ms10240 INTEGER(0..10239)

},

shortDRX SEQUENCE {

drx-ShortCycle ENUMERATED {

ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,

ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,

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

drx-ShortCycleTimer INTEGER (1..16)

} OPTIONAL, -- Need R

drx-SlotOffset INTEGER (0..31)

}

DRX-ConfigExt-v1700 ::= SEQUENCE {

drx-HARQ-RTT-TimerDL-r17 INTEGER (0..448),

drx-HARQ-RTT-TimerUL-r17 INTEGER (0..448)

}

DRX-ConfigExt2-v1800 ::= SEQUENCE {

drx-NonIntegerLongCycleStartOffset-r18 CHOICE {

ms1001over240 INTEGER(0..3),

ms25over6 INTEGER(0..3),

ms25over3 INTEGER(0..7),

ms1001over120 INTEGER(0..7),

ms100over9 INTEGER(0..10),

ms25over2 INTEGER(0..11),

ms40over3 INTEGER(0..12),

ms125over9 INTEGER(0..12),

ms50over3 INTEGER(0..15),

ms1001over60 INTEGER(0..15),

ms125over6 INTEGER(0..19),

ms200over9 INTEGER(0..21),

ms250over9 INTEGER(0..26),

ms100over3 INTEGER(0..32),

ms1001over30 INTEGER(0..32),

ms75over2 INTEGER(0..36),

ms125over3 INTEGER(0..40),

ms1001over24 INTEGER(0..40),

ms200over3 INTEGER(0..65),

ms1001over15 INTEGER(0..65),

ms250over3 INTEGER(0..82),

ms1001over12 INTEGER(0..82),

ms400over3 INTEGER(0..132),

...

},

shortDRX-r18 SEQUENCE {

drx-NonIntegerShortCycle-r18 ENUMERATED {ms1001over240, ms25over6, ms25over3, ms1001over120, ms100over9, ms25over2,

ms40over3, ms125over9, ms50over3, ms1001over60, ms125over6, ms200over9,

ms100over3, ms1001over30, ms125over3, ms1001over24, ms200over3, spare15,

spare14, spare13, spare12, spare11, spare10, spare9, spare8, spare7, spare6,

spare5, spare4, spare3, spare2, spare1},

drx-ShortCycleTimer-r18 INTEGER (1..16)

} OPTIONAL, -- Need R

drx-TimeReferenceSFN-r18 ENUMERATED {sfn512} OPTIONAL -- Need N

}

-- TAG-DRX-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *DRX-Config* field descriptions |
| ***drx-HARQ-RTT-TimerDL***  Value in number of symbols of the BWP where the transport block was received. *drx-HARQ-RTT-TimerDL-r17* is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore *drx-HARQ-RTT-TimerDL* (without suffix) for SCS 480 kHz and 960 kHz. |
| ***drx-HARQ-RTT-TimerUL***  Value in number of symbols of the BWP where the transport block was transmitted. *drx-HARQ-RTT-TimerUL-r17* is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore *drx-HARQ-RTT-TimerUL* (without suffix) for SCS 480 kHz and 960 kHz. |
| ***drx-InactivityTimer***  Value in multiple integers of 1 ms. *ms0* corresponds to 0, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on. |
| ***drx-LongCycleStartOffset***  *drx-LongCycle* in ms and *drx-StartOffset* in multiples of 1 ms. If *drx-ShortCycle* is configured, the value of *drx-LongCycle* shall be a multiple of the *drx-ShortCycle* value. |
| ***drx-NonIntegerLongCycleStartOffset***  *drx-NonIntegerLongCycle* in non-integer number of ms (e.g. *ms1001over240* corresponds to 1001/240 ms, *ms25over6* corresponds to 25/6 ms and so on) and *drx-StartOffset* in multiples of 1 ms. If *drx-NonIntegerShortCycle* is configured, the value of *drx-NonIntegerLongCycle* shall be a multiple of the *drx-NonIntegerShortCycle* value. If *drx-NonIntegerLongCycleStartOffset-r18* is configured, the UE shall ignore *drx-LongCycleStartOffset*. |
| ***drx-NonIntegerShortCycle***  Value in non-integer number of ms, e.g. *ms1001over240* corresponds to 1001/240 ms, *ms25over6* corresponds to 25/6 ms and so on. |
| ***drx-onDurationTimer***  Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value *ms1* corresponds to 1 ms, value *ms2* corresponds to 2 ms, and so on. |
| ***drx-RetransmissionTimerDL***  Value in number of slot lengths of the BWP where the transport block was received. value *sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |
| ***drx-RetransmissionTimerUL***  Value in number of slot lengths of the BWP where the transport block was transmitted. *sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |
| ***drx-ShortCycleTimer***  Value in multiples of *drx-ShortCycle* or *drx-NonIntegerShortCycle* (depending on which one is configured). A value of 1 corresponds to *drx-ShortCycle* or *drx-NonIntegerShortCycle*, a value of 2 corresponds to 2 \* *drx-ShortCycle* or 2 \* *drx-NonIntegerShortCycle* and so on. |
| ***drx-ShortCycle***  Value in ms. *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on. |
| ***drx-SlotOffset***  Value in 1/32 ms. Value 0 corresponds to 0 ms, value 1 corresponds to 1/32 ms, value 2 corresponds to 2/32 ms, and so on. |
| ***drx-TimeReferenceSFN***  Indicates how the UE initializes the counter DRX\_SFN\_COUNTER, see TS 38.321 [3], clause 5.7. |
| ***shortDRX***  Configuration of a short DRX cycle. The network configures only one of *shortDRX* (without a suffix) or *shortDRX-r18.* |

#### – *DRX-ConfigSecondaryGroup*

The IE *DRX-ConfigSecondaryGroup* is used to configure DRX related parameters for the second DRX group as specified in TS 38.321 [3].

*DRX-ConfigSecondaryGroup* information element

-- ASN1START

-- TAG-DRX-CONFIGSECONDARYGROUP-START

DRX-ConfigSecondaryGroup-r16 ::= SEQUENCE {

drx-onDurationTimer-r16 CHOICE {

subMilliSeconds INTEGER (1..31),

milliSeconds ENUMERATED {

ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,

ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,

ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 }

},

drx-InactivityTimer-r16 ENUMERATED {

ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,

ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,

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

}

-- TAG-DRX-CONFIGSECONDARYGROUP-STOP

-- ASN1STOP

|  |
| --- |
| *DRX-ConfigSecondaryGroup* field descriptions |
| ***drx-InactivityTimer***  Value in multiple integers of 1 ms. *ms0* corresponds to 0 ms, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on, as specified in TS 38.321 [3]. The network configures a *drx-InactivityTimer* value for the second DRX group that is smaller than the *drx-InactivityTimer* configured for the default DRX group in IE *DRX-Config*. |
| ***drx-onDurationTimer***  Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSeconds). For the latter, value *ms1* corresponds to 1 ms, value *ms2* corresponds to 2 ms, and so on, as specified in TS 38.321 [3]. The network configures a *drx-onDurationTimer* value for the second DRX group that is smaller than the *drx-onDurationTimer* configured for the default DRX group in IE *DRX-Config*. |

#### *– DRX-ConfigSL*

The IE *DRX-ConfigSL* is used to configure additional DRX parameters for the UE performing sidelink operation with resource allocation mode 1, as specified in TS 38.321 [3].

*DRX-ConfigSL* information element

-- ASN1START

-- TAG-DRX-CONFIGSL-START

DRX-ConfigSL-r17 ::= SEQUENCE {

drx-HARQ-RTT-TimerSL-r17 INTEGER (0..56),

drx-RetransmissionTimerSL-r17 ENUMERATED {sl0, sl1, sl2, sl4, sl6, sl8, sl16, sl24, sl33, sl40, sl64, sl80, sl96, sl112, sl128,

sl160, sl320, spare15, spare14, spare13, spare12, spare11, spare10, spare9, spare8,

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

}

-- TAG-DRX-CONFIGSL-STOP

-- ASN1STOP

|  |
| --- |
| *DRX-ConfigSL* field descriptions |
| ***drx-HARQ-RTT-TimerSL***  For sidelink configured grant Type 1, value in number of symbols of the activated DL BWP of PCell. For other cases, value in number of symbols of the BWP where the PDCCH was transmitted. Value 0 is used in case *sl-PUCCH-Config* is not configured and the corresponding resource pool is not configured with PSFCH. |
| *drx-RetransmissionTimerSL*  For sidelink configured grant Type 1, value in number of slot lengths of the activated DL BWP of PCell. For other cases, value in number of slot lengths of the BWP where the PDCCH was transmitted. *sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |

#### – *EarlyUL-SyncConfig*

The IE *EarlyUL-SyncConfig* is used to configure random access resources for the early UL synchronization procedure.

*EarlyUL-SyncConfig* information element

-- ASN1START

-- TAG-EARLYUL-SYNCCONFIG-START

EarlyUL-SyncConfig-r18 ::= SEQUENCE {

frequencyInfoUL-r18 FrequencyInfoUL,

rach-ConfigGeneric-r18 RACH-ConfigGeneric,

bwp-GenericParameters-r18 BWP,

ssb-PerRACH-Occasion-r18 ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen} OPTIONAL, -- Need R

prach-RootSequenceIndex-r18 CHOICE {

l839 INTEGER (0..837),

l139 INTEGER (0..137)

} OPTIONAL, -- Need R

ltm-PRACH-SubcarrierSpacing-r18 SubcarrierSpacing OPTIONAL, -- Need L139

n-TimingAdvanceOffset-r18 ENUMERATED { n0, n25600, n39936, spare1 } OPTIONAL, -- Need R

...

}

-- TAG-EARLYUL-SYNCCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *EarlyUL-SyncConfig field descriptions* |
| ***frequencyInfoUL***  This field provides basic parameters of an uplink carrier for PRACH transmission on a candidate cell. |
| ***ltm-PRACH-SubcarrierSpacing***  Indicates subcarrier spacing of PRACH for LTM (see TS 38.211 [16], clause 5.3.2).  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 60 or 120 kHz  FR2-2: 120, 480, or 960 kHz  If absent, the UE applies the SCS as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]). |
| ***n-TimingAdvanceOffset***  The N\_TA-Offset to be applied for all uplink transmissions on a candidate cell. If the field is absent, the UE applies the value as defined in TS 38.133 [14], table 7.1.2-2. |
| ***rach-ConfigGeneric***  RACH parameters for performing a random access procedure on a candidate cell. |
| ***ssb-PerRACH-Occasion***  This field indicated the number of SSBs for RACH occasion. |

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

#### – *EphemerisInfo*

The IE *EphemerisInfo* provides satellite ephemeris. Ephemeris may be expressed either in format of position and velocity state vector in ECEF or in format of orbital parameters in ECI. Note: The ECI and ECEF coincide at *epochTime*, i.e., x,y,z axis in ECEF are aligned with x,y,z axis in ECI at *epochTime*.

*EphemerisInfo* information element

-- ASN1START

-- TAG-EPHEMERISINFO-START

EphemerisInfo-r17 ::= CHOICE {

positionVelocity-r17 PositionVelocity-r17,

orbital-r17 Orbital-r17

}

PositionVelocity-r17 ::= SEQUENCE {

positionX-r17 PositionStateVector-r17,

positionY-r17 PositionStateVector-r17,

positionZ-r17 PositionStateVector-r17,

velocityVX-r17 VelocityStateVector-r17,

velocityVY-r17 VelocityStateVector-r17,

velocityVZ-r17 VelocityStateVector-r17

}

Orbital-r17 ::= SEQUENCE {

semiMajorAxis-r17 INTEGER (0..8589934591),

eccentricity-r17 INTEGER (0..1048575),

periapsis-r17 INTEGER (0..268435455),

longitude-r17 INTEGER (0..268435455),

inclination-r17 INTEGER (-67108864..67108863),

meanAnomaly-r17 INTEGER (0..268435455)

}

PositionStateVector-r17 ::= INTEGER (-33554432..33554431)

VelocityStateVector-r17 ::= INTEGER (-131072..131071)

-- TAG-EPHEMERISINFO-STOP

-- ASN1STOP

|  |
| --- |
| *EphemerisInfo* field descriptions |
| ***eccentricity***  Satellite orbital parameter: eccentricity e, see NIMA TR 8350.2 [71]. Unit is radian.  Step of 1.431 \* 10-8. Actual value = field value \* (1.431 \* 10-8). |
| ***inclination***  Satellite orbital parameter: inclination i, see NIMA TR 8350.2 [71]. Unit is radian.  Step of 2.341\* 10-8 rad. Actual value = field value \* (2.341\* 10-8). |
| ***longitude***  Satellite orbital parameter: longitude of ascending node Ω, see NIMA TR 8350.2 [71]. Unit is radian.  Step of 2.341\* 10-8 rad. Actual value = field value \* (2.341\* 10-8). |
| ***meanAnomaly***  Satellite orbital parameter: Mean anomaly M at epoch time, see NIMA TR 8350.2 [71]. Unit is radian.  Step of 2.341\* 10-8 rad. Actual value = field value \* (2.341\* 10-8). |
| ***periapsis***  Satellite orbital parameter: argument of periapsis ω, see NIMA TR 8350.2 [71]. Unit is radian.  Step of 2.341\* 10-8 rad. Actual value = field value \* (2.341\* 10-8). |
| ***positionX, positionY, positionZ***  X, Y, Z coordinate of satellite position state vector in ECEF. Unit is meter.  Step of 1.3 m. Actual value = field value \* 1.3. |
| ***semiMajorAxis***  Satellite orbital parameter: semi major axis α, see NIMA TR 8350.2 [71]. Unit is meter.  Stepof 4.249 \* 10-3 m. Actual value = 6500000 + field value \* (4.249 \* 10-3). |
| ***velocityVX, velocityVY, velocityVZ***  X, Y, Z coordinate of satellite velocity state vector in ECEF. Unit is meter/second.  Step of 0.06 m/s. Actual value = field value \* 0.06. |

#### – *EpochTime*

The IE *EpochTime* is used to indicate the epoch time for the NTN assistance information, and it is defined as the starting time of a DL sub-frame, indicated by a SFN and a sub-frame number signaled together with the assistance information. The reference point for *EpochTime* of the serving or neighbour NTN payload ephemeris and Common TA parameters is the uplink time synchronization reference point when this field is provided in an NTN cell and the gNB when this field is provided in a TN cell.

*EpochTime* information element

-- ASN1START

-- TAG-EPOCHTIME-START

EpochTime-r17 ::= SEQUENCE {

sfn-r17 INTEGER(0..1023),

subFrameNR-r17 INTEGER(0..9)

}

-- TAG-EPOCHTIME-STOP

-- ASN1STOP

|  |
| --- |
| *EpochTime* field descriptions |
| ***sfn***  For serving cell, it indicates the current SFN or the next upcoming SFN after the frame where the message indicating the *epochTime* is received. For neighbour cell, it indicates the SFN nearest to the frame where the message indicating the *epochTime* is received. |

#### – *EUTRA-C-RNTI*

The IE *EUTRA-C-RNTI* identifies a UE having a RRC connection within an E-UTRA cell.

*EUTRA-C-RNTI* information element

-- ASN1START

-- TAG-EUTRACRNTI-START

EUTRA-C-RNTI ::= BIT STRING (SIZE (16))

-- TAG-EUTRACRNTI-STOP

-- ASN1STOP

#### – *FeatureCombination*

The IE *FeatureCombination* indicates a feature or a combination of features to be associated with a set of Random Access resources (i.e. an instance of *FeatureCombinationPreambles*).

*FeatureCombination* information element

-- ASN1START

-- TAG-FEATURECOMBINATION-START

FeatureCombination-r17 ::= SEQUENCE {

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

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

nsag-r17 NSAG-List-r17 OPTIONAL, -- Need R

msg3-Repetitions-r17 ENUMERATED {true} OPTIONAL, -- Need R

msg1-Repetitions-r18 ENUMERATED {true} OPTIONAL, -- Need R

eRedCap-r18 ENUMERATED {true} OPTIONAL, -- Need R

spare2 ENUMERATED {true} OPTIONAL, -- Need R

spare1 ENUMERATED {true} OPTIONAL -- Need R

}

NSAG-List-r17 ::= SEQUENCE (SIZE (1.. maxSliceInfo-r17)) OF NSAG-ID-r17

-- TAG-FEATURECOMBINATION-STOP

-- ASN1STOP

|  |
| --- |
| *FeatureCombination* field descriptions |
| ***eRedCap***  If present, this field indicates that eRedCap is part of this feature combination. The fields *redCap* and *eRedCap* shall not be both set to *true*. If the UE is an eRedCap UE and there is no set of configured RA resources with *eRedCap* set to *true* among all sets of configured RA resources, the UE considers *redCap* to be applicable for random access procedure. This field is not configured in a set of preambles that is configured with 2-step random-access type. |
| ***msg1-Repetitions***  If present, this field indicates that signalling of msg1 repetition is part of this feature combination. This field is not configured in a set of preambles that is configured with 2-step random-access type. |
| ***msg3-Repetitions***  If present, this field indicates that signalling of msg3 repetition is part of this feature combination. This field is not configured in a set of preambles that is configured with 2-step random-access type. |
| ***nsag***  If present, this field indicates NSAG(s) that are part of this feature combination. |
| ***redCap***  If present, this field indicates that RedCap is part of this feature combination. |
| ***smallData***  If present, this field indicates that Small Data is part of this feature combination. |

#### – *FeatureCombinationPreambles*

The IE *FeatureCombinationPreambles* associatesa set of preambles with a feature combination. For parameters which can be provided in this IE, the UE applies this field value when performing Random Access using a preamble in this featureCombinationPreambles, otherwise the UE applies the corresponding value as determined by applicable Need Code, e.g. Need S. On a specific BWP, there can be at most one set of preambles associated with a given feature combination per RA Type (i.e. 4-step RACH or 2-step RACH) per MSG1 repetition number.

*FeatureCombinationPreambles* information element

-- ASN1START

-- TAG-FEATURECOMBINATIONPREAMBLES-START

FeatureCombinationPreambles-r17 ::= SEQUENCE {

featureCombination-r17 FeatureCombination-r17,

startPreambleForThisPartition-r17 INTEGER (0..63),

numberOfPreamblesPerSSB-ForThisPartition-r17 INTEGER (1..64),

ssb-SharedRO-MaskIndex-r17 INTEGER (1..15) OPTIONAL, -- Need S

groupBconfigured-r17 SEQUENCE {

ra-SizeGroupA-r17 ENUMERATED {b56, b144, b208, b256, b282, b480, b640,

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

messagePowerOffsetGroupB-r17 ENUMERATED { minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},

numberOfRA-PreamblesGroupA-r17 INTEGER (1..64)

} OPTIONAL, -- Need R

separateMsgA-PUSCH-Config-r17 MsgA-PUSCH-Config-r16 OPTIONAL, -- Cond MsgAConfigCommon

msgA-RSRP-Threshold-r17 RSRP-Range OPTIONAL, -- Need R

rsrp-ThresholdSSB-r17 RSRP-Range OPTIONAL, -- Need R

deltaPreamble-r17 INTEGER (-1..6) OPTIONAL, -- Need R

...,

[[

msg1-RepetitionNum-r18 ENUMERATED {n2, n4, n8, spare1} OPTIONAL, -- Cond Msg1Rep2

msg1-RepetitionTimeOffsetROGroup-r18 ENUMERATED {n4, n8, n16, spare1} OPTIONAL -- Cond Msg1Rep3

]]

}

-- TAG-FEATURECOMBINATIONPREAMBLES-STOP

-- ASN1STOP

|  |
| --- |
| *FeatureCombinationPreambles* field descriptions |
| ***deltaPreamble***  Power offset between msg3 or msgA-PUSCH and RACH preamble transmission. If configured, this parameter overrides *msg3-DeltaPreamble* or *msgA-DeltaPreamble*, Actual value = field value \* 2 [dB] (see TS 38.213 [13], clause 7.1). If *msgA-DeltaPreamble* is configured in *separateMsgA-PUSCH-Config-r17*, this field is absent. This field is set to the same value for all *FeatureCombinationPreambles* for MSG1 repetitions. |
| ***featureCombination***  Indicates which combination of features that the preambles indicated by this IE are associated with. The UE ignores a RACH resource defined by this *FeatureCombinationPreambles* if any feature within the *featureCombination* is not supported by the UE or if any of the spare fields within the *featureCombination* is set to *true*. |
| ***messagePowerOffsetGroupB***  Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on (see TS 38.321 [3], clause 5.1.2). |
| ***msg1-RepetitionNum***  Indicates which MSG1-repetition number that this *FeatureCombinationPreambles* is associated with. |
| ***msg1-RepetitionTimeOffsetROGroup***  Indicates a time offset of the starting ROs between two successive RO groups for a given repetition number (2, 4 or 8) associated with this *FeatureCombinationPreambles* for each frequency resource index within a time period (see TS 38.213 [13]). If this field is absent, the time offset is implicitly determined (see TS 38.213 [13]).  For each MSG1 repetition number, the following values are applicable.  • {n16}, for RO groups for MSG1 repetition number 8  • {n8, n16}, for RO groups for MSG1 repetition number 4  • {n4, n8, n16}, for RO groups for MSG1 repetition number 2 |
| ***msgA-RSRP-Threshold***  The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the concerned feature combination in the BWP. If configured, this parameter overrides *msgA-RSRP-Threshold-r16*. If absent, the UE applies *msgA-RSRP-Threshold-r16*, if configured |
| ***numberOfPreamblesPerSSB-ForThisPartition***  It determines how many consecutive preambles are associated to the Feature Combination starting from the starting preamble(s) per SSB. |
| ***numberOfRA-PreamblesGroupA***  It determines how many consecutive preambles per SSB are associated to Group A starting from the starting preamble(s). The remaining preambles associated to the Feature Combination are associated to Group B |
| ***ra-SizeGroupA***  Transport Blocks size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.2). If this feature combination preambles are associated to a *RACH-ConfigCommon-twostepRA*, this field correspond to *ra-MsgA-SizeGroupA*, otherwise it corresponds to *ra-Msg3SizeGroupA*. |
| ***rsrp-ThresholdSSB***  UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]). If this parameter is included in *FeatureCombinationPreambles* which is included in *RACH-ConfigCommonTwoStepRA*, it corresponds to *msgA-RSRP-ThresholdSSB*, as defined in TS 38.321 [3]. If this parameter is included in *FeatureCombinationPreambles* which is included in *RACH-ConfigCommon*, it it corresponds to *rsrp-ThresholdSSB*, as defined in TS 38.321 [3]. |
| ***separateMsgA-PUSCH-Config***  If present, it specifies how the 2-step RACH preambles identified by this *FeatureCombinationPreambles* are mapped to a PUSCH slot separate from the one defined in MsgA-ConfigCommon-r16. If the field is absent, the UE should apply the corresponding parameter in the *RACH-ConfigCommonTwoStepRA* of the BWP which includes the *FeatureCombinationPreambles IE*. |
| ***ssb-SharedRO-MaskIndex***  Mask index (see TS 38.321 [3]).  Indicates a subset of ROs where preambles are allocated for this feature combination.  If this field is configured within *FeatureCombinationPreambles* which is included in *RACH-ConfigCommonTwoStepRA*:  - in case of separate ROs are configured for 4-step and 2-step random access, this field indicates a subset of ROs configured within this *RACH-ConfigCommonTwoStepRA*;  - in case shared ROs are used for 4-step and 2-step random access, it indicates the subset of ROs configured within *RACH-ConfigCommon*, which are the subset of ROs configured for 2-step random access.  This field is configured when there is more than one RO per SSB. If the field is absent, all ROs configured in *RACH-ConfigCommon* or *RACH-ConfigCommonTwoStepRA* containing this *FeatureCombinationPreambles* are shared. The network does not configure this field, if the field *msg1-RepetitionNum* is configured. |
| ***startPreambleForThisPartition***  It defines the first preamble associated with the Feature Combination. If the UE is provided with a number N of SSB block indexes associated with one PRACH occasion, and N<1, the first preamble in each PRACH occasion is the one having the same index as indicated by this field. If N>=1, N blocks of preambles associated with the Feature Combination are defined, each having start index + *startPreambleForThisPartition*, where n refers to SSB block index (see TS 38.213 [13], clause 8.1). |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *MsgAConfigCommon* | The field is optionally present, Need S, if *FeatureCombinationPreambles* is included in *RACH-ConfigCommonTwoStepRA*. Otherwise, it is absent. If the field is absent in *FeatureCombinationPreambles* included in *RACH-ConfigCommonTwoStepRA*, the UE applies *MsgA-PUSCH-Config* included in the corresponding *MsgA-ConfigCommon*. |
| *Msg1Rep2* | The field is mandatory present, Need R, if msg1-Repetitions is included in FeatureCombination for this concerned FeatureCombinationPreambles. Otherwise, it is absent. |
| *Msg1Rep3* | The field is optionally present, Need S, if msg1-Repetitions is included in FeatureCombination for this concerned FeatureCombinationPreambles. Otherwise, it is absent. |

#### – *FilterCoefficient*

The IE *FilterCoefficient* specifies the measurement filtering coefficient. Value *fc0* corresponds to k = 0, *fc1* corresponds to k = 1, and so on.

*FilterCoefficient* information element

-- ASN1START

-- TAG-FILTERCOEFFICIENT-START

FilterCoefficient ::= ENUMERATED { fc0, fc1, fc2, fc3, fc4, fc5, fc6, fc7, fc8, fc9, fc11, fc13, fc15, fc17, fc19, spare1, ...}

-- TAG-FILTERCOEFFICIENT-STOP

-- ASN1STOP

#### – *FreqBandIndicatorNR*

The IE *FreqBandIndicatorNR* is used to convey an NR frequency band number as defined in TS 38.101-1 [15], TS 38.101-2 [39] and TS 38.101-5 [75].

*FreqBandIndicatorNR* information element

-- ASN1START

-- TAG-FREQBANDINDICATORNR-START

FreqBandIndicatorNR ::= INTEGER (1..1024)

-- TAG-FREQBANDINDICATORNR-STOP

-- ASN1STOP

#### – *FreqPriorityListDedicatedSlicing*

The IE *FreqPriorityListDedicatedSlicing* provides dedicated cell reselection priorities for slicing in *RRCRelease*.

*FreqPriorityListDedicatedSlicing* information element

-- ASN1START

-- TAG-FREQPRIORITYLISTDEDICATEDSLICING-START

FreqPriorityListDedicatedSlicing-r17 ::= SEQUENCE (SIZE (1.. maxFreq)) OF FreqPriorityDedicatedSlicing-r17

FreqPriorityDedicatedSlicing-r17 ::= SEQUENCE {

dl-ExplicitCarrierFreq-r17 ARFCN-ValueNR,

sliceInfoListDedicated-r17 SliceInfoListDedicated-r17 OPTIONAL -- Cond Mandatory

}

SliceInfoListDedicated-r17 ::= SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF SliceInfoDedicated-r17

SliceInfoDedicated-r17 ::= SEQUENCE {

nsag-IdentityInfo-r17 NSAG-IdentityInfo-r17,

nsag-CellReselectionPriority-r17 CellReselectionPriority OPTIONAL, -- Need R

nsag-CellReselectionSubPriority-r17 CellReselectionSubPriority OPTIONAL -- Need R

}

-- TAG-FREQPRIORITYLISTDEDICATEDSLICING-STOP

-- ASN1STOP

| *FreqPriorityDedicatedSlicing* field descriptions |
| --- |
| ***dl-ExplicitCarrierFreq***  Indicates the downlink carrier frequency to which *SliceInfoListDedicated* is associated. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *Mandatory* | The field is mandatory present. |

#### – *FreqPriorityListSlicing*

The IE *FreqPriorityListSlicing* indicates cell reselection priorities for slicing in SIB16.

*FreqPriorityListSlicing* information element

-- ASN1START

-- TAG-FREQPRIORITYLISTSLICING-START

FreqPriorityListSlicing-r17 ::= SEQUENCE (SIZE (1..maxFreqPlus1)) OF FreqPrioritySlicing-r17

FreqPrioritySlicing-r17 ::= SEQUENCE {

dl-ImplicitCarrierFreq-r17 INTEGER (0..maxFreq),

sliceInfoList-r17 SliceInfoList-r17 OPTIONAL -- Cond Mandatory

}

SliceInfoList-r17 ::= SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF SliceInfo-r17

SliceInfo-r17 ::= SEQUENCE {

nsag-IdentityInfo-r17 NSAG-IdentityInfo-r17,

nsag-CellReselectionPriority-r17 CellReselectionPriority OPTIONAL, -- Need R

nsag-CellReselectionSubPriority-r17 CellReselectionSubPriority OPTIONAL, -- Need R

sliceCellListNR-r17 CHOICE {

sliceAllowedCellListNR-r17 SliceCellListNR-r17,

sliceExcludedCellListNR-r17 SliceCellListNR-r17

} OPTIONAL -- Need R

}

SliceCellListNR-r17 ::= SEQUENCE (SIZE (1..maxCellSlice-r17)) OF PCI-Range

-- TAG-FREQPRIORITYLISTSLICING-STOP

-- ASN1STOP

| *FreqPriorityListSlicing* field descriptions |
| --- |
| ***dl-ImplicitCarrierFreq***  Indicates the downlink carrier frequency to which *sliceInfoList* is associated with. The frequency is signalled implicitly, value 0 corresponds to the serving frequency, value 1 corresponds to the first frequency indicated by the *InterFreqCarrierFreqList* in SIB4, and value 2 corresponds to the second frequency indicated by the *InterFreqCarrierFreqList* in SIB4, and so on. |

| *SliceInfo* field descriptions |
| --- |
| ***sliceAllowedCellListNR***  List of allow-listed cells for slicing. If present, the cells listed in this list support the corresponding nsag-frequency pair, and the cells not listed in this list do not support the corresponding nsag-frequency pair, according to TS 38.304 [20], clause 5.2.4.11. |
| ***sliceCellListNR***  Contains either the list of allow-listed or exclude-listed cells for slicing. If absent, it implies all the cells support the corresponding nsag-frequency pair, according to 38.304 [20], clause 5.2.4.11. |
| ***sliceExcludedCellListNR***  List of exclude-listed cells for slicing. If present, the cells listed in this list do not support the corresponding nsag-frequency pair, and the cells not listed in this list support the corresponding nsag-frequency pair, according to TS 38.304 [20], clause 5.2.4.11. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *Mandatory* | The field is mandatory present. |

#### – *FrequencyInfoDL*

The IE *FrequencyInfoDL* provides basic parameters of a downlink carrier and transmission thereon.

*FrequencyInfoDL* information element

-- ASN1START

-- TAG-FREQUENCYINFODL-START

FrequencyInfoDL ::= SEQUENCE {

absoluteFrequencySSB ARFCN-ValueNR OPTIONAL, -- Cond SpCellAdd

frequencyBandList MultiFrequencyBandListNR,

absoluteFrequencyPointA ARFCN-ValueNR,

scs-SpecificCarrierList SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,

...,

[[

referenceCell-r18 ServCellIndex OPTIONAL -- Cond SSBlessSCell

]]

}

-- TAG-FREQUENCYINFODL-STOP

-- ASN1STOP

|  |
| --- |
| *FrequencyInfoDL* field descriptions |
| ***absoluteFrequencyPointA***  Absolute frequency position of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A (see TS 38.211 [16], clause 4.4.4.2). Note that the lower edge of the actual carrier is not defined by this field but rather in the *scs-SpecificCarrierList*. |
| ***absoluteFrequencySSB***  Frequency of the SSB to be used for this serving cell. SSB related parameters (e.g. SSB index) provided for a serving cell refer to this SSB frequency unless mentioned otherwise. The CD-SSB of the PCell is always on the sync raster. Frequencies are considered to be on the sync raster if they are also identifiable with a GSCN value (see TS 38.101-1 [15] or TS 38.101-5 [75]). If the field is absent, the SSB related parameters should be absent, e.g. *ssb-PositionsInBurst*, *ssb-periodicityServingCell* and *subcarrierSpacing* in *ServingCellConfigCommon* IE. If the field is absent, the UE obtains timing reference from the intra-band SpCell or intra-band SCell if applicable as described in TS 38.213 [13], clause 4.1, or from the SpCell or an SCell indicated by *referenceCell,* or from the reference serving cell defined in TS 38.133 [14]. This is supported in case the SCell for which the UE obtains the timing reference is in the same or different frequency band as the cell (i.e. the SpCell or the SCell, respectively) from which the UE obtains the timing reference.  This field corresponds to the CD-SSB. |
| ***frequencyBandList***  List containing only one frequency band to which this carrier(s) belongs. Multiple values are not supported. |
| ***referenceCell***  Indicates the reference cell, i.e. the cell which provides the timing reference and AGC source for the inter-band SSB-less SCell. If the reference cell is an SCell or PSCell, it should be an activated SCell or activated PSCell.  If this field is absent for an inter-band SSB-less SCell, the reference serving cell is defined in TS 38.133 [14]. |
| ***scs-SpecificCarrierList***  A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A. The network configures a *scs-SpecificCarrier* at least for each numerology (SCS) that is used e.g. in a BWP (see TS 38.211 [16], clause 5.3). |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *SpCellAdd* | The field is mandatory present if this *FrequencyInfoDL* is for SpCell. Otherwise the field is optionally present, Need S. |
| *SSBlessSCell* | The field is optionally present, Need S, if the inter-band SSB-less SCell is configured for this cell and *absoluteFrequencySSB* is absent. It is absent otherwise. |

*End of changes*