**3GPP TSG-RAN WG2 Meeting #117-e *R2-2204126***

**Electronic, 21st Feb – 3rd Mar 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **2891** | **rev** | **2** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HELP***](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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Extending NR operation to 71 GHz | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2022-03-10 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduction of operation for FR2-2.  SubcarrierSpacing   * Should support 120/480/960 kHz for FR2-2. * Higher layer parameter list in R1-2112976 * RAN2#116bis-e agreements * Additions in R1-2200699 * RAN2#117-e agreements | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | *SubcarrierSpacing* is extended by the values 120/480/960KHz for FR2-2 (no new IE needed). The field descriptions are updated for   * *BWP (subcarrierSpacing)* * *RACH-ConfigCommon (msg1-SubcarrierSpacing)* * *RACH-ConfigCommonTwoStepRA (msgA-SubcarrierSpacing)* * *LogicalChannelConfig (allowedSCS-List)* * *MeasIdleConfig (ssbSubcarrierSpacing)* * *RateMatchPattern (subcarrierSpacing)* * *SCS-SpecificCarrier (ssbSubcarrierSpacing)* * *ServingCellConfigCommon (ssbSubcarrierSpacing)* * *SRS-Config (ssbSubcarrierSpacing)* * *TDD-UL-DL-ConfigCommon (referenceSubcarrierSpacing)* * *RRCRelease (ssbSubcarrierSpacing)* * *SIB4 (ssbSubcarrierSpacing)* * *MeasObjectNR (ssbSubcarrierSpacing)* * *MeasObjectCLI (srs-SCS)* * *MeasObjectCLI (rssi-SCS)* * *CSI-RS-ResourceConfigMobility (subcarrierSpacing)*   SSB subcarrier spacing supports 120/480/960 kHz for FR2-2   * Add clarification in MIB that for FR2-2, only same SCS for SSB and coreset 0 is supported (same as for NR-U).   *RACH-ConfigCommon* / *RACH-ConfigCommonTwoStepRA*   * Add valid combination of PRACH SCS and length (see comment for SCS):   + 120KHz - 139/571/1151   + 480KHz - 139/571   + 960KHz - 139   *RACH-ConfigGeneric*:   * Add a new parameter *ra-ResponseWindow-r17* with the value ENUMERATED {sl240, sl320, sl640, sl960, sl1280, sl1920, sl2560}.   *RACH-ConfigGenericTwoStepRA*:   * Add a new parameter msgB-ResponseWindow-r17 with the value ENUMERATED {sl240, sl640, sl960, sl1280, sl1920, sl2560}.   *ServingCellConfigCommon / ServingCellConfigCommonSIB:*   * Add *discoveryBurstWindowLength-r17* with new value range that is applicable to SCS 480 kHz and SCS 960 kHz. * Updated field descriptions for *ssb-PositionsInBurst*    + Impacts *ServingCellConfigCommon* (64-bit *longBitmap* is used for FR2 instead of 8-bit *mediumBitmap*), *ServingCellConfigCommonSIB* (*groupPresence* is used for FR2)   + Clarify relation to N\_SSB^QCL   HARQ   * The parameter *timeDomainHARQ-BundlingType1-r17* with the value “ENUMERATED {enabled}” is introduced in *ServingCellConfig*   Scheduling   * New *PUSCH-TimeDomainResourceAllocationListForMultiPUSCH-r17* to support different k2 range for 480/960 kHz   + Impacts *PUSCH-TimeDomainResourceAllocationList* and *PUSCH-Config*   + The new *PDSCH-TimeDomainResourceAllocation-r17* IE can be configured with either PDSCH repetition or multiple PDSCH.   + Introduce the field *pdsch-TimeDomainAllocationListDCI-1-2-r17* and the field *pdsch-TimeDomainAllocationList-r17* so that PDSCH repetitions can be used with the new k0 value range.   + *pusch-TimeDomainAllocationListForMultiPUSCH-r17* is configured with up to 16 list elements.   *PDSCH-Config*   * Add new parameter *dmrs-FD-OCC-Disabled-ForRank1-PDSCH* (parameter name adjusted to comply with ASN.1 naming convention) * New *PDSCH-TimeDomainResourceAllocationListForMultiPDSCH-r17*   + Impacts *PDSCH-TimeDomainResourceAllocationList* and *PDSCH-Config*   + Introduce the field *pusch-TimeDomainAllocationListDCI-1-2-r17* and the field *pusch-TimeDomainAllocationList-r17* so that PUSCH repetition can be used with the new k2 value range.   Channel access   * Add parameter *channelAccessMode2* (was LBT-mode; aligned name with existing *channelAccessMode* for FR1 which also describes LBT procedures) * Impacts *ServingCellConfigCommon* and *ServingCellConfigCommonSIB* for cell-specific config * Impacts *ServingCellConfig* for UE-specific config   *PUCCH-Config*   * Add parameter *nrofPRB* to configure up to 16 PRBs for *PUCCH-Formats* 0, 1, and 4 * Add *DL-DataToUL-ACK-r17* with extended value ranges * Add *DL-DataToUL-ACK-1-2-r17* with extended value ranges * Add *UL-AccessConfigListDCI-1-1-r17* with a new value range   *PUSCH-Config:*   * Add *UL-AccessConfigListDCI-0-1-r17* with a new value range in   *LogicalChannelConfig*:   * Only adopt the new value 0.01ms for maxPUSCH-Duration for FR2-2   *SPS-Config*:   * Add new *periodicityExt* for 480 kHz and 960 kHz   *ConfiguredGrantConfig*:   * Add *CG-COT-Sharing-r17* to indicate offset and duration with extended values from 0..39 to 0..139. * Add new *periodicityExt* and *timeDomainOffset* for 480 kHz and 960 kHz   *UEAssistanceInformation:*   * Add new power saving and overheating parameters to reflect the new SCS, K0/K2, and bandwidth sizes for FR2-2. * Added corresponding UE procedural text * Add configuration for *maxBW-PreferenceFR2-2-r17*, *maxMIMO-LayerPreferenceFR2-2-r17*, *minSchedulingOffsetPreferenceFR2-2-r17* in *OtherConfig* * Include *allowedReducedConfigForOverheating-r17* in *CG-ConfigInfo*   *DRX-Config*:   * Extend value range for *drx-HARQ-RTT-TimerDL* and *drx-HARQ-RTT-TimerUL*; impacts also *MAC-CellGroupConfig*   Additions in R1-2200699:   * Add *nrofHARQ-BundlingGroups-r17* (aligned with naming convention, was *numberOfHARQ-BundlingGroups-r17*) in *ServingCellConfig*: "For type2 HARQ-ACK codebook, configure the number of HARQ bundling groups per serving cell”; values {1,2,4} * Added *monitoringSlotPeriodicityAndOffset-r17* and *monitoringSlotsWithinSlotGroup-r17* in *SearchSpace* * Add *monitoringCapability-r17* in *PDCCH-Config* * For *RMTC-Config*, add *rmtc-Bandwidth-r17*, *measDurationSymbols-r17* and *ref-SCS-CP-r17* to include values for 120 kHz, 480 kHz, and 960 kHz | | | | | | | | |
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| ***Consequences if not approved:*** | | Operation for FR2-2 is not supported | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.3.5.9, 5.5.2.10a, 5.7.4.1, 5.7.4.2, 5.7.4.3, 5.7.4.3a, 6.2.2, 6.3.1, 6.3.2, 6.3.4, 6.4, 11.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.300 CR0408,  TS 38.306 CR2966,  TS 38.321 CR1219  TS 36.306 CR1845,  TS 36.331 CR4778  TS 37.213, TS 38.211, TS 38.212, TS 38.213, TS 38.214, TS 38.215 | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R2-2203644 revision 1  R2-2202435 | | | | | | | | |

< First change >

5.3.5.9 Other configuration

The UE shall:

1> if the received *otherConfig* includes the *delayBudgetReportingConfig*:

2> if *delayBudgetReportingConfig* is set to *setup*:

3> consider itself to be configured to send delay budget reports in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to send delay budget reports and stop timer T342, if running.

1> if the received *otherConfig* includes the *overheatingAssistanceConfig*:

2> if *overheatingAssistanceConfig* is set to *setup*:

3> consider itself to be configured to provide overheating assistance information in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide overheating assistance information and stop timer T345, if running;

1> if the received *otherConfig* includes the *idc-AssistanceConfig*:

2> if *idc-AssistanceConfig* is set to *setup*:

3> consider itself to be configured to provide IDC assistance information in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide IDC assistance information;

1> if the received *otherConfig* includes the *drx-PreferenceConfig*:

2> if *drx-PreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on DRX parameters for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on DRX parameters for power saving for the cell group and stop timer T346a associated with the cell group, if running;

1> if the received *otherConfig* includes the *maxBW-PreferenceConfig*:

2> if *maxBW-PreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the maximum aggregated bandwidth for power saving for the cell group in accordance with 5.7.4;

3> if *otherConfig* includes *maxBW-PreferenceConfigFR2-2:*

4> consider itself to be configured to provide its preference on the maximum aggregated bandwidth for FR2-2 for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the maximum aggregated bandwidth for power saving for the cell group and stop timer T346b associated with the cell group, if running;

1> if the received *otherConfig* includes the *maxCC-PreferenceConfig*:

2> if *maxCC-PreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the maximum number of secondary component carriers for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the maximum number of secondary component carriers for power saving for the cell group and stop timer T346c associated with the cell group, if running;

1> if the received *otherConfig* includes the *maxMIMO-LayerPreferenceConfig*:

2> if *maxMIMO-LayerPreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the maximum number of MIMO layers for power saving for the cell group in accordance with 5.7.4;

3> if *otherConfig* includes *maxMIMO-LayerPreferenceConfigFR2-2:*

4> consider itself to be configured to provide its preference on the maximum number of MIMO layers for FR2-2 for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the maximum number of MIMO layers for power saving for the cell group and stop timer T346d associated with the cell group, if running;

1> if the received *otherConfig* includes the *minSchedulingOffsetPreferenceConfig*:

2> if *minSchedulingOffsetPreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the minimum scheduling offset for cross-slot scheduling for power saving for the cell group in accordance with 5.7.4;

3> if *otherConfig* includes *minSchedulingOffsetPreferenceConfigExt:*

4> consider itself to be configured to provide its preference on the minimum scheduling offset for 480 kHz SCS and/or 960 kHz SCS for cross-slot scheduling for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the minimum scheduling offset for cross-slot scheduling for power saving for the cell group and stop timer T346e associated with the cell group, if running;

1> if the received *otherConfig* includes the *releasePreferenceConfig*:

2> if *releasePreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide assistance information to transition out of RRC\_CONNECTED in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide assistance information to transition out of RRC\_CONNECTED and stop timer T346f, if running.

1> if the received *otherConfig* includes the *obtainCommonLocation*:

2> include available detailed location information for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

NOTE 1: The UE is requested to attempt to have valid detailed location information available whenever sending a measurement report for which it is configured to include available detailed location information. The UE may not succeed e.g. because the user manually disabled the GPS hardware, due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.

1> if the received *otherConfig* includes the *btNameList*:

2> if *btNameList* is set to *setup*, include available Bluetooth measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

1> if the received *otherConfig* includes the *wlanNameList*:

2> if *wlanNameList* is set to *setup*, include available WLAN measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

1> if the received *otherConfig* includes the *sensorNameList*:

2> if *sensorNameList* is set to *setup*, include available Sensor measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

NOTE 2: The UE is requested to attempt to have valid Bluetooth measurements, WLAN measurements and Sensor measurements whenever sending a measurement report for which it is configured to include these measurements. The UE may not succeed e.g. because the user manually disabled the WLAN or Bluetooth or Sensor hardware. Further details, e.g. regarding when to activate WLAN or Bluetooth or Sensor, are up to UE implementation.

1> if the received *otherConfig* includes the *sl-AssistanceConfigNR*:

2> consider itself to be configured to provide configured grant assistance information for NR sidelink communication in accordance with 5.7.4;

1> if the received *otherConfig* includes the *referenceTimePreferenceReporting*:

2> consider itself to be configured to provide UE reference time assistance information in accordance with 5.7.4;

1> else:

2> consider itself not to be configured to provide UE reference time assistance information;

< Unmodified parts omitted >

5.5.2.10a RSSI measurement timing configuration

The UE shall setup the RSSI measurement timing configuration (RMTC) in accordance with the received *rmtc-Periodicity* and, if configured, with *rmtc-SubframeOffset* i.e. the first symbol of each RMTC occasion occurs at first symbol of an SFN and subframe of the NR SpCell meeting the following condition:

SFN mod *T* = FLOOR(*rmtc-SubframeOffset*/10);

subframe = *rmtc-SubframeOffset* mod 10;

with *T* = *rmtc-Periodicity*/10;

On the frequency configured by *rmtc-Frequency*, the UE shall not consider RSSI measurements outside the configured RMTC occasion which lasts for *measDurationSymbols* for RSSI and channel occupancy measurements.

The UE derives the RSSI measurement duration from a combination of *measDurationSymbols* and *ref-SCS-CP*. At least for RSSI measurement confined within the active DL BWP, the UE performs RSSI measurement using the numerology of the active DL BWP during the derived measurement duration. Otherwise, the numerology used by the UE for measurements is up to UE implementation. If configured, the UE performs RSSI measurements on a bandwidth in accordance with the received *rmtc-Bandwidth*.

< Unmodified parts omitted >

5.7.4 UE Assistance Information

5.7.4.1 General



**Figure 5.7.4.1-1: UE Assistance Information**

The purpose of this procedure is for the UE to inform the network of:

- its delay budget report carrying desired increment/decrement in the connected mode DRX cycle length, or;

- its overheating assistance information, or;

- its IDC assistance information, or;

- its preference on DRX parameters for power saving, or;

- its preference on the maximum aggregated bandwidth for power saving, or;

- its preference on the maximum number of secondary component carriers for power saving, or;

- its preference on the maximum number of MIMO layers for power saving, or;

- its preference on the minimum scheduling offset for cross-slot scheduling for power saving, or;

- its preference on the RRC state, or;

- configured grant assistance information for NR sidelink communication, or;

- its preference in being provisioned with reference time information.

5.7.4.2 Initiation

A UE capable of providing delay budget report in RRC\_CONNECTED may initiate the procedure in several cases, including upon being configured to provide delay budget report and upon change of delay budget preference.

A UE capable of providing overheating assistance information in RRC\_CONNECTED may initiate the procedure if it was configured to do so, upon detecting internal overheating, or upon detecting that it is no longer experiencing an overheating condition.

A UE capable of providing IDC assistance information in RRC\_CONNECTED may initiate the procedure if it was configured to do so, upon detecting IDC problem if the UE did not transmit an IDC assistance information since it was configured to provide IDC indications, or upon change of IDC problem information.

A UE capable of providing its preference on DRX parameters of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a preference on DRX parameters and upon change of its preference on DRX parameters.

A UE capable of providing its preference on the maximum aggregated bandwidth of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum aggregated bandwidth preference and upon change of its maximum aggregated bandwidth preference.

A UE capable of providing its preference on the maximum number of secondary component carriers of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum number of secondary component carriers preference and upon change of its maximum number of secondary component carriers preference.

A UE capable of providing its preference on the maximum number of MIMO layers of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum number of MIMO layers preference and upon change of its maximum number of MIMO layers preference.

A UE capable of providing its preference on the minimum scheduling offset for cross-slot scheduling of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a minimum scheduling offset preference and upon change of its minimum scheduling offset preference.

A UE capable of providing assistance information to transition out of RRC\_CONNECTED state may initiate the procedure if it was configured to do so, upon determining that it prefers to transition out of RRC\_CONNECTED state, or upon change of its preferred RRC state.

A UE capable of providing configured grant assistance information for NR sidelink communication in RRC\_CONNECTED may initiate the procedure in several cases, including upon being configured to provide traffic pattern information and upon change of traffic patterns.

A UE capable of providing an indication of its preference in being provisioned with reference time information may initiate the procedure upon being configured to provide this indication, or if it was configured to provide this indication and upon change of its preference.

Upon initiating the procedure, the UE shall:

1> if configured to provide delay budget report:

2> if the UE did not transmit a *UEAssistanceInformation* message with *delayBudgetReport* since it was configured to provide delay budget report; or

2> if the current delay budget is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *delayBudgetReport* and timer T342 is not running:

3> start or restart timer T342 with the timer value set to the *delayBudgetReportingProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide a delay budget report;

1> if configured to provide overheating assistance information:

2> if the overheating condition has been detected and T345 is not running; or

2> if the current overheating assistance information is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *overheatingAssistance* and timer T345 is not running:

3> start timer T345 with the timer value set to the *overheatingIndicationProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide overheating assistance information;

1> if configured to provide IDC assistance information:

2> if the UE did not transmit a *UEAssistanceInformation* message with *idc-Assistance* since it was configured to provide IDC assistance information:

3> if on one or more frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself; or

3> if on one or more supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:

4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide IDC assistance information;

2> else if the current IDC assistance information is different from the one indicated in the last transmission of the *UEAssistanceInformation* message:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide IDC assistance information;

NOTE 1: The term "IDC problems" refers to interference issues applicable across several subframes/slots where not necessarily all the subframes/slots are affected.

NOTE 2: For the frequencies on which a serving cell or serving cells is configured that is activated, IDC problems consist of interference issues that the UE cannot solve by itself, during either active data exchange or upcoming data activity which is expected in up to a few hundred milliseconds.  
For frequencies on which a SCell or SCells is configured that is deactivated, reporting IDC problems indicates an anticipation that the activation of the SCell or SCells would result in interference issues that the UE would not be able to solve by itself.  
For a non-serving frequency, reporting IDC problems indicates an anticipation that if the non-serving frequency or frequencies became a serving frequency or serving frequencies then this would result in interference issues that the UE would not be able to solve by itself.

1> if configured to provide its preference on DRX parameters of a cell group for power saving:

2> if the UE has a preference on DRX parameters of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *drx-Preference* for the cell group since it was configured to provide its preference on DRX parameters of the cell group for power saving; or

2> if the current *drx-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *drx-Preference* for the cell group and timer T346a associated with the cell group is not running:

3> start the timer T346a with the timer value set to the *drx-PreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *drx-Preference*;

1> if configured to provide its preference on the maximum aggregated bandwidth of a cell group for power saving:

2> if the UE has a preference on the maximum aggregated bandwidth of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxBW-Preference* and/or *maxBW-PreferenceFR2-2* for the cell group since it was configured to provide its preference on the maximum aggregated bandwidth of the cell group for power saving; or

2> if the current *maxBW-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxBW-Preference* and/or *maxBW-PreferenceFR2-2* for the cell group and timer T346b associated with the cell group is not running:

3> start the timer T346b with the timer value set to the *maxBW-PreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxBW-Preference* and/or *maxBW-PreferenceFR2-2*;

1> if configured to provide its preference on the maximum number of secondary component carriers of a cell group for power saving:

2> if the UE has a preference on the maximum number of secondary component carriers of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxCC-Preference* for the cell group since it was configured to provide its preference on the maximum number of secondary component carriers of the cell group for power saving; or

2> if the current *maxCC-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxCC-Preference* for the cell group and timer T346c associated with the cell group is not running:

3> start the timer T346c with the timer value set to the *maxCC-PreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxCC-Preference*;

1> if configured to provide its preference on the maximum number of MIMO layers of a cell group for power saving:

2> if the UE has a preference on the maximum number of MIMO layers of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2* for the cell group since it was configured to provide its preference on the maximum number of MIMO layers of the cell group for power saving; or

2> if the current *maxMIMO-LayerPreference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2* for the cell group and timer T346d associated with the cell group is not running:

3> start the timer T346d with the timer value set to the *maxMIMO-LayerPreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2*;

1> if configured to provide its preference on the minimum scheduling offset for cross-slot scheduling of a cell group for power saving:

2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt* for the cell group since it was configured to provide its preference on the minimum scheduling offset for cross-slot scheduling of the cell group for power saving; or

2> if the current *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt* for the cell group and timer T346e associated with the cell group is not running:

3> start the timer T346e with the timer value set to the *minSchedulingOffsetPreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt*;

1> if configured to provide its release preference and timer T346f is not running:

2> if the UE determines that it would prefer to transition out of RRC\_CONNECTED state; or

2> if the UE is configured with *connectedReporting* and the UE determines that it would prefer to revert an earlier indication to transition out of RRC\_CONNECTED state:

3> start timer T346f with the timer value set to the *releasePreferenceProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the release preference;

1> if configured to provide configured grant assistance information for NR sidelink communication:

2> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide configured grant assistance information for NR sidelink communication;

1> if configured to provide preference in being provisioned with reference time information:

2> if the UE did not transmit a *UEAssistanceInformation* message with *referenceTimeInfoPreference* since it was configured to provide preference; or

2> if the UE's preference changed from the last time UE initiated transmission of the *UEAssistanceInformation* message including *referenceTimeInfoPreference*:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide preference in being provisioned with reference time information.

5.7.4.3 Actions related to transmission of *UEAssistanceInformation* message

The UE shall set the contents of the *UEAssistanceInformation* message as follows:

1> if transmission of the *UEAssistanceInformation* message is initiated to provide a delay budget report according to 5.7.4.2 or 5.3.5.3;

2> set *delayBudgetReport* to *type1* according to a desired value;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide overheating assistance information according to 5.7.4.2 or 5.3.5.3;

2> if the UE experiences internal overheating:

3> if the UE prefers to temporarily reduce the number of maximum secondary component carriers:

4> include *reducedMaxCCs* in the *OverheatingAssistance* IE;

4> set *reducedCCsDL* to the number of maximum SCells the UE prefers to be temporarily configured in downlink;

4> set *reducedCCsUL* to the number of maximum SCells the UE prefers to be temporarily configured in uplink;

3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR1:

4> include *reducedMaxBW-FR1* in the *OverheatingAssistance* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR1;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR1;

3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-1:

4> include *reducedMaxBW-FR2* in the *OverheatingAssistance* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-1;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-1;

3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-2:

4> include *reducedMaxBW-FR2-2* in the *OverheatingAssistance* IE;

4> set *reducedBW-DL-FR2-2* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-2;

4> set *reducedBW-UL-FR2-2* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-2;

3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR1:

4> include *reducedMaxMIMO-LayersFR1* in the *OverheatingAssistance* IE;

4> set *reducedMIMO-LayersFR1-DL* to the number of maximum MIMO layers of each serving cell operating on FR1 the UE prefers to be temporarily configured in downlink;

4> set *reducedMIMO-LayersFR1-UL* to the number of maximum MIMO layers of each serving cell operating on FR1 the UE prefers to be temporarily configured in uplink;

3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-1:

4> include *reducedMaxMIMO-LayersFR2* in the *OverheatingAssistance* IE;

4> set *reducedMIMO-LayersFR2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 the UE prefers to be temporarily configured in downlink;

4> set *reducedMIMO-LayersFR2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 the UE prefers to be temporarily configured in uplink;

3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-2:

4> include *reducedMaxMIMO-LayersFR2-2* in the *OverheatingAssistance* IE;

4> set *reducedMIMO-LayersFR2-2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2 the UE prefers to be temporarily configured in downlink;

4> set *reducedMIMO-LayersFR2-2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2 the UE prefers to be temporarily configured in uplink;

2> else (if the UE no longer experiences an overheating condition):

3> do not include *reducedMaxCCs*, *reducedMaxBW-FR1*, *reducedMaxBW-FR2*, *reducedMaxBW-FR2-2*, *reducedMaxMIMO-LayersFR1,* *reducedMaxMIMO-LayersFR2* and *reducedMaxMIMO-LayersFR2-2* in *OverheatingAssistance* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide IDC assistance information according to 5.7.4.2 or 5.3.5.3:

2> if there is at least one carrier frequency included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:

3> include the field *affectedCarrierFreqList* with an entry for each affected carrier frequency included in *candidateServingFreqListNR*;

3> for each carrier frequency included in the field *affectedCarrierFreqList*, include *interferenceDirection* and set it accordingly;

2> if there is at least one supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:

3> include *victimSystemType* for each UL CA combination included in *affectedCarrierFreqCombList*;

3> if the UE sets *victimSystemType* to *wlan* or *bluetooth*:

4> include *affectedCarrierFreqCombList* with an entry for each supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, that is affected by IDC problems;

3> else:

4> optionally include *affectedCarrierFreqCombList* with an entry for each supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, that is affected by IDC problems;

NOTE 1: When sending an *UEAssistanceInformation* message to inform the IDC problems, the UE includes all IDC assistance information (rather than providing e.g. the changed part(s) of the IDC assistance information).

NOTE 2: Upon not anymore experiencing a particular IDC problem that the UE previously reported, the UE provides an IDC indication with the modified contents of the *UEAssistanceInformation* message (e.g. by not including the IDC assistance information in the *idc-Assistance* field).

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *drx-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *drx-Preference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on DRX parameters for the cell group:

3> if the UE has a preference for the long DRX cycle:

4> include *preferredDRX-LongCycle* in the *DRX-Preference* IE andset it to the preferred value;

3> if the UE has a preference for the DRX inactivity timer:

4> include *preferredDRX-InactivityTimer* in the *DRX-Preference* IE and set it to the preferred value;

3> if the UE has a preference for the short DRX cycle:

4> include *preferredDRX-ShortCycle* in the *DRX-Preference* IE and set it to the preferred value;

3> if the UE has a preference for the short DRX timer:

4> include *preferredDRX-ShortCycleTimer* in the *DRX-Preference* IE and set it to the preferred value;

2> else (if the UE has no preference on DRX parameters for the cell group):

3> do not include *preferredDRX-LongCycle, preferredDRX-InactivityTimer, preferredDRX-ShortCycle* and *preferredDRX-ShortCycleTimer* in the *DRX-Preference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxBW-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxBW-Preference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum aggregated bandwidth for the cell group:

3> if the UE prefers to reduce the maximum aggregated bandwidth of FR1:

4> include *reducedMaxBW-FR1* in the *MaxBW-Preference* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR1in the cell group;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR1in the cell group;

3> if the UE prefers to reduce the maximum aggregated bandwidth of FR2-1:

4> include *reducedMaxBW-FR2* in the *MaxBW-Preference* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR2-1in the cell group;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR2-1in the cell group;

2> else (if the UE has no preference on the maximum aggregated bandwidth for the cell group):

3> do not include *reducedMaxBW-FR1* and *reducedMaxBW-FR2* in the *MaxBW-Preference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxBW-PreferenceFR2-2* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxBW-PreferenceFR2-2* in the *UEAssistanceInformation* message;

3> if the UE prefers to reduce the maximum aggregated bandwidth of FR2-2:

4> include *reducedMaxBW-FR2-2* in the *MaxBW-PreferenceFR2-2* IE;

4> set *reducedBW-FR2-2-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR2-2in the cell group;

4> set *reducedBW-FR2-2-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR2-2in the cell group;

2> else (if the UE has no preference on the maximum aggregated bandwidth for the cell group):

3> do not include *reducedMaxBW-FR2-2* in the *MaxBW-PreferenceFR2-2* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxCC-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxCC-Preference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum number of secondary component carriers for the cell group:

3> include *reducedMaxCCs* in the *MaxCC-Preference* IE;

3> set *reducedCCsDL* to the number of maximum SCells the UE desires to have configured in downlinkin the cell group;

3> set *reducedCCsUL* to the number of maximum SCells the UE desires to have configured in uplinkin the cell group;

2> else (if the UE has no preference on the maximum number of secondary component carriers for the cell group):

3> do not include *reducedMaxCCs* in the *MaxCC-Preference* IE;

NOTE 3: The UE can implicitly indicate a preference for NR SCG release by reporting the maximum aggregated bandwidth preference for power saving of the cell group, if configured, as zero for both FR1 and FR2, and by reporting the maximum number of secondary component carriers for power saving of the cell group, if configured, as zero for both uplink and downlink.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxMIMO-LayerPreference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxMIMO-LayerPreference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum number of MIMO layers for the cell group:

3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR1:

4> include *reducedMaxMIMO-LayersFR1* in the *MaxMIMO-LayerPreference* IE;

4> set *reducedMIMO-LayersFR1-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR1 serving cell that the UE operates on in the cell group;

4> set *reducedMIMO-LayersFR1-UL* to the preferred maximum number of uplink MIMO layers of each FR1 serving cell that the UE operates on in the cell group;

3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR2-1:

4> include *reducedMaxMIMO-LayersFR2* in the *MaxMIMO-LayerPreference* IE;

4> set *reducedMIMO-LayersFR2-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR2-1 serving cell that the UE operates on in the cell group;

4> set *reducedMIMO-LayersFR2-UL* to the preferred maximum number of uplink MIMO layers of each FR2-1 serving cell that the UE operates on in the cell group;

2> else (if the UE has no preference on the maximum number of MIMO layers for the cell group):

3> do not include *reducedMaxMIMO-LayersFR1* and *reducedMaxMIMO-LayersFR2* in the *MaxMIMO-LayerPreference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxMIMO‑LayerPreferenceFR2‑2* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxMIMO-LayerPreferenceFR2-2* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum number of MIMO layers for the cell group for FR2-2:

3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR2‑2:

4> include *reducedMaxMIMO-LayersFR2-2* in the *MaxMIMO-LayerPreferenceFR2‑2* IE;

4> set *reducedMIMO-LayersFR2-2-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR2-2 serving cell that the UE operates on in the cell group;

4> set *reducedMIMO-LayersFR2-2-UL* to the preferred maximum number of uplink MIMO layers of each FR2-2 serving cell that the UE operates on in the cell group;

2> else (if the UE has no preference on the maximum number of MIMO layers for the cell group):

3> do not include *reducedMaxMIMO-LayersFR2-2* in the *MaxMIMO-LayerPreferenceFR2-2* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *minSchedulingOffsetPreference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *minSchedulingOffsetPreference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling for the cell group:

3> if the UE has a preference for the value of K0 (TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling with 15 kHz SCS:

4> include *preferredK0-SCS-15kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*0;

3> if the UE has a preference for the value of K0 for cross-slot scheduling with 30 kHz SCS:

4> include *preferredK0-SCS-30kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*0;

3> if the UE has a preference for the value of K0 for cross-slot scheduling with 60 kHz SCS:

4> include *preferredK0-SCS-60kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*0;

3> if the UE has a preference for the value of K0 for cross-slot scheduling with 120 kHz SCS:

4> include *preferredK0-SCS-120kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*0;

3> if the UE has a preference for the value of K2 (TS 38.214 [19], clause 6.1.2.1) for cross-slot scheduling with 15 kHz SCS:

4> include *preferredK2-SCS-15kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*2;

3> if the UE has a preference for the value of K2 for cross-slot scheduling with 30 kHz SCS:

4> include *preferredK2-SCS-30kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*2;

3> if the UE has a preference for the value of K2 for cross-slot scheduling with 60 kHz SCS:

4> include *preferredK2-SCS-60kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*2;

3> if the UE has a preference for the value of K2 for cross-slot scheduling with 120 kHz SCS:

4> include *preferredK2-SCS-120kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*2;

2> else (if the UE has no preference on the minimum scheduling offset for cross-slot scheduling for the cell group):

3> do not include *preferredK0* and *preferredK2* in the *MinSchedulingOffsetPreference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *minSchedulingOffsetPreferenceExt* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *minSchedulingOffsetPreferenceExt* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling for the cell group for FR2-2:

3> include *minSchedulingOffsetPreferenceExt* in the *UEAssistanceInformation* message;

4> if the UE has a preference for the value of K0 (TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling with 480 kHz SCS:

5> include *preferredK0-SCS-480kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of *K*0;

4> if the UE has a preference for the value of K0 for cross-slot scheduling with 960 kHz SCS:

5> include *preferredK0-SCS-960kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of *K*0;

4> if the UE has a preference for the value of K2 for cross-slot scheduling with 480 kHz SCS:

5> include *preferredK2-SCS-480kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of *K*2;

4> if the UE has a preference for the value of K2 for cross-slot scheduling with 960 kHz SCS:

5> include *preferredK2-SCS-960kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of *K*2;

3> else (if the UE has no preference on the minimum scheduling offset for cross-slot scheduling for the cell group):

4> do not include *preferredK0* and *preferredK2* in the *minSchedulingOffsetPreferenceExt* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide a release preference according to 5.7.4.2 or 5.3.5.3:

2> include *releasePreference* in the *UEAssistanceInformation* message;

2> set *preferredRRC-State* to the desired RRC state on transmission of the *UEAssistanceInformation* message;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication of preference in being provisioned with reference time information according to 5.7.4.2 or 5.3.5.3:

2> if the UE has a preference in being provisioned with reference time information:

3> set *referenceTimeInfoPreference* to *true*;

2> else:

3> set *referenceTimeInfoPreference* to *false*.

The UE shall set the contents of the *UEAssistanceInformation* message for configured grant assistance information for NR sidelink communication:

1> if configured to provide configured grant assistance information for NR sidelink communication:

2> include the *sl-UE-AssistanceInformationNR*;

NOTE 4: It is up to UE implementation when and how to trigger configured grant assistance information for NR sidelink communication.

The UE shall:

1> if the procedure was triggered to provide configured grant assistance information for NR sidelink communication by an NR *RRCReconfiguration* message that was embedded within an E-UTRA *RRCConnectionReconfiguration*:

2> submit the *UEAssistanceInformation* to lower layers via SRB1, embedded in E-UTRA RRC message *ULInformationTransferIRAT* as specified in TS 36.331 [10], clause 5.6.28;

1> else if the UE is in (NG)EN-DC:

2> if SRB3 is configured:

3> submit the *UEAssistanceInformation* message via SRB3 to lower layers for transmission;

2> else:

3> submit the *UEAssistanceInformation* message via the E-UTRA MCG embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10].

1> else if the UE is in NR-DC:

2> if the UE assistance configuration that triggered this UE assistance information is associated with the SCG:

3> if SRB3 is configured:

4> submit the *UEAssistanceInformation* message via SRB3 to lower layers for transmission;

3> else:

4> submit the *UEAssistanceInformation* message via the NR MCG embedded in NR RRC message *ULInformationTransferMRDC* as specified in5.7.2a.3;

2> else:

3> submit the *UEAssistanceInformation* message via SRB1 to lower layers for transmission;

1> else:

2> submit the *UEAssistanceInformation* message to lower layers for transmission.

5.7.4.3a Setting the contents of *OverheatingAssistance* IE

The UE shall set the contents of *OverheatingAssistance* IE if initiated to provide overheating assistance indication for SCG in (NG)EN-DC according to clause 5.6.10.3 as specified in TS 36.331 [10]:

1> if the UE prefers to temporarily reduce the number of maximum secondary component carriers for SCG:

2> include *reducedMaxCCs* in the *OverheatingAssistance* IE;

2> set *reducedCCsDL* to the number of maximum SCells of the SCG the UE prefers to be temporarily configured in downlink;

2> set *reducedCCsUL* to the number of maximum SCells of the SCG the UE prefers to be temporarily configured in uplink;

1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR1 for SCG:

2> include *reducedMaxBW-FR1* in the *OverheatingAssistance* IE;

2> set *reducedBW-FR1-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR1 of the SCG;

2> set *reducedBW-FR1-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR1 of the SCG;

1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-1 for SCG:

2> include *reducedMaxBW-FR2* in the *OverheatingAssistance* IE;

2> set *reducedBW-FR2-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-1 of the SCG;

2> set *reducedBW-FR2-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-1 of the SCG;

1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR1 for SCG:

2> include *reducedMaxMIMO-LayersFR1* in the *OverheatingAssistance* IE;

2> set *reducedMIMO-LayersFR1-DL* to the number of maximum MIMO layers of each serving cell operating on FR1 of the SCG the UE prefers to be temporarily configured in downlink;

2> set *reducedMIMO-LayersFR1-UL* to the number of maximum MIMO layers of each serving cell operating on FR1 of the SCG the UE prefers to be temporarily configured in uplink;

1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-1 for SCG:

2> include *reducedMaxMIMO-LayersFR2* in the *OverheatingAssistance* IE;

2> set *reducedMIMO-LayersFR2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 of the SCG the UE prefers to be temporarily configured in downlink;

2> set *reducedMIMO-LayersFR2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 of the SCG the UE prefers to be temporarily configured in uplink;

Editor’s note: Can consider in the next meeting if LTE RRC CR is needed for this WI based on contributions.

< Unmodified parts omitted >

6.2.2 Message definitions

< Unmodified parts omitted >

– *MIB*

The *MIB* includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: Network to UE

***MIB***

-- ASN1START

-- TAG-MIB-START

MIB ::= SEQUENCE {

systemFrameNumber BIT STRING (SIZE (6)),

subCarrierSpacingCommon ENUMERATED {scs15or60, scs30or120},

ssb-SubcarrierOffset INTEGER (0..15),

dmrs-TypeA-Position ENUMERATED {pos2, pos3},

pdcch-ConfigSIB1 PDCCH-ConfigSIB1,

cellBarred ENUMERATED {barred, notBarred},

intraFreqReselection ENUMERATED {allowed, notAllowed},

spare BIT STRING (SIZE (1))

}

-- TAG-MIB-STOP

-- ASN1STOP

|  |
| --- |
| ***MIB* field descriptions** |
| ***cellBarred***  Value *barred* means that the cell is barred, as defined in TS 38.304 [20]. This field is ignored by IAB-MT. |
| ***dmrs-TypeA-Position***  Position of (first) DM-RS for downlink (see TS 38.211 [16], clause 7.4.1.1.2) and uplink (see TS 38.211 [16], clause 6.4.1.1.3). |
| ***intraFreqReselection***  Controls cell selection/reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 38.304 [20]. This field is ignored by IAB-MT. |
| ***pdcch-ConfigSIB1***  Determines a common *ControlResourceSet* (CORESET), a common search space and necessary PDCCH parameters. If the field *ssb-SubcarrierOffset* indicates that *SIB1* is absent, the field *pdcch-ConfigSIB1* indicates the frequency positions where the UE may find SS/PBCH block with *SIB1* or the frequency range where the network does not provide SS/PBCH block with *SIB1* (see TS 38.213 [13], clause 13). |
| ***ssb-SubcarrierOffset***  Corresponds to kSSB (see TS 38.213 [13]), which is the frequency domain offset between SSB and the overall resource block grid in number of subcarriers. (See TS 38.211 [16], clause 7.4.3.1). For operation with shared spectrum channel access (see 37.213 [48]), this field corresponds to , and kSSB is obtained from (see TS 38.211 [16], clause 7.4.3.1); the LSB of this field is used also for deriving the QCL relation between SS/PBCH blocks as specified in TS 38.213 [13], clause 4.1.  The value range of this field may be extended by an additional most significant bit encoded within PBCH as specified in TS 38.213 [13].  This field may indicate that this cell does not provide *SIB1* and that there is hence no CORESET#0 configured in *MIB* (see TS 38.213 [13], clause 13). In this case, the field *pdcch-ConfigSIB1* may indicate the frequency positions where the UE may (not) find a SS/PBCH with a control resource set and search space for *SIB1* (see TS 38.213 [13], clause 13). |
| ***subCarrierSpacingCommon***  Subcarrier spacing for *SIB1*, Msg.2/4 and MsgB for initial access, paging and broadcast SI-messages. If the UE acquires this *MIB* on an FR1 carrier frequency, the value *scs15or60* corresponds to 15 kHz and the value *scs30or120* corresponds to 30 kHz. If the UE acquires this *MIB* on an FR2 carrier frequency, the value *scs15or60* corresponds to 60 kHz and the value *scs30or120* corresponds to 120 kHz. For operation with shared spectrum channel access in FR1 (see 37.213 [48]) and for operation in FR2-2, the subcarrier spacing for *SIB1*, Msg.2/4 and MsgB for initial access, paging and broadcast SI-messages is same as that for the corresponding SSB.For operation with shared spectrum channel access, this field instead is used for deriving the QCL relation between SS/PBCH blocks as specified in TS 38.213 [13], clause 4.1. |
| ***systemFrameNumber***  The 6 most significant bits (MSB) of the 10-bit System Frame Number (SFN). The 4 LSB of the SFN are conveyed in the PBCH transport block as part of channel coding (i.e. outside the *MIB* encoding), as defined in clause 7.1 in TS 38.212 [17]. |

< Unmodified parts omitted >

– *RRCReconfiguration*

The *RRCReconfiguration* message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) and AS security configuration.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

***RRCReconfiguration message***

-- ASN1START

-- TAG-RRCRECONFIGURATION-START

RRCReconfiguration ::= SEQUENCE {

rrc-TransactionIdentifier RRC-TransactionIdentifier,

criticalExtensions CHOICE {

rrcReconfiguration RRCReconfiguration-IEs,

criticalExtensionsFuture SEQUENCE {}

}

}

RRCReconfiguration-IEs ::= SEQUENCE {

radioBearerConfig RadioBearerConfig OPTIONAL, -- Need M

secondaryCellGroup OCTET STRING (CONTAINING CellGroupConfig) OPTIONAL, -- Cond SCG

measConfig MeasConfig OPTIONAL, -- Need M

lateNonCriticalExtension OCTET STRING OPTIONAL,

nonCriticalExtension RRCReconfiguration-v1530-IEs OPTIONAL

}

RRCReconfiguration-v1530-IEs ::= SEQUENCE {

masterCellGroup OCTET STRING (CONTAINING CellGroupConfig) OPTIONAL, -- Need M

fullConfig ENUMERATED {true} OPTIONAL, -- Cond FullConfig

dedicatedNAS-MessageList SEQUENCE (SIZE(1..maxDRB)) OF DedicatedNAS-Message OPTIONAL, -- Cond nonHO

masterKeyUpdate MasterKeyUpdate OPTIONAL, -- Cond MasterKeyChange

dedicatedSIB1-Delivery OCTET STRING (CONTAINING SIB1) OPTIONAL, -- Need N

dedicatedSystemInformationDelivery OCTET STRING (CONTAINING SystemInformation) OPTIONAL, -- Need N

otherConfig OtherConfig OPTIONAL, -- Need M

nonCriticalExtension RRCReconfiguration-v1540-IEs OPTIONAL

}

RRCReconfiguration-v1540-IEs ::= SEQUENCE {

otherConfig-v1540 OtherConfig-v1540 OPTIONAL, -- Need M

nonCriticalExtension RRCReconfiguration-v1560-IEs OPTIONAL

}

RRCReconfiguration-v1560-IEs ::= SEQUENCE {

mrdc-SecondaryCellGroupConfig SetupRelease { MRDC-SecondaryCellGroupConfig } OPTIONAL, -- Need M

radioBearerConfig2 OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL, -- Need M

sk-Counter SK-Counter OPTIONAL, -- Need N

nonCriticalExtension RRCReconfiguration-v1610-IEs OPTIONAL

}

RRCReconfiguration-v1610-IEs ::= SEQUENCE {

otherConfig-v1610 OtherConfig-v1610 OPTIONAL, -- Need M

bap-Config-r16 SetupRelease { BAP-Config-r16 } OPTIONAL, -- Need M

iab-IP-AddressConfigurationList-r16 IAB-IP-AddressConfigurationList-r16 OPTIONAL, -- Need M

conditionalReconfiguration-r16 ConditionalReconfiguration-r16 OPTIONAL, -- Need M

daps-SourceRelease-r16 ENUMERATED{true} OPTIONAL, -- Need N

t316-r16 SetupRelease {T316-r16} OPTIONAL, -- Need M

needForGapsConfigNR-r16 SetupRelease {NeedForGapsConfigNR-r16} OPTIONAL, -- Need M

onDemandSIB-Request-r16 SetupRelease { OnDemandSIB-Request-r16 } OPTIONAL, -- Need M

dedicatedPosSysInfoDelivery-r16 OCTET STRING (CONTAINING PosSystemInformation-r16-IEs) OPTIONAL, -- Need N

sl-ConfigDedicatedNR-r16 SetupRelease {SL-ConfigDedicatedNR-r16} OPTIONAL, -- Need M

sl-ConfigDedicatedEUTRA-Info-r16 SetupRelease {SL-ConfigDedicatedEUTRA-Info-r16} OPTIONAL, -- Need M

targetCellSMTC-SCG-r16 SSB-MTC OPTIONAL, -- Need S

nonCriticalExtension RRCReconfiguration-v17xy-IEs OPTIONAL

}

RRCReconfiguration-v17xy-IEs ::= SEQUENCE {

otherConfig-v17xy OtherConfig-v17xy OPTIONAL, -- Need M

nonCriticalExtension SEQUENCE {} OPTIONAL

}

MRDC-SecondaryCellGroupConfig ::= SEQUENCE {

mrdc-ReleaseAndAdd ENUMERATED {true} OPTIONAL, -- Need N

mrdc-SecondaryCellGroup CHOICE {

nr-SCG OCTET STRING (CONTAINING RRCReconfiguration),

eutra-SCG OCTET STRING

}

}

BAP-Config-r16 ::= SEQUENCE {

bap-Address-r16 BIT STRING (SIZE (10)) OPTIONAL, -- Need M

defaultUL-BAP-RoutingID-r16 BAP-RoutingID-r16 OPTIONAL, -- Need M

defaultUL-BH-RLC-Channel-r16 BH-RLC-ChannelID-r16 OPTIONAL, -- Need M

flowControlFeedbackType-r16 ENUMERATED {perBH-RLC-Channel, perRoutingID, both} OPTIONAL, -- Need R

...

}

MasterKeyUpdate ::= SEQUENCE {

keySetChangeIndicator BOOLEAN,

nextHopChainingCount NextHopChainingCount,

nas-Container OCTET STRING OPTIONAL, -- Cond securityNASC

...

}

OnDemandSIB-Request-r16 ::= SEQUENCE {

onDemandSIB-RequestProhibitTimer-r16 ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30}

}

T316-r16 ::= ENUMERATED {ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms1000, ms1500, ms2000}

IAB-IP-AddressConfigurationList-r16 ::= SEQUENCE {

iab-IP-AddressToAddModList-r16 SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressConfiguration-r16 OPTIONAL, -- Need N

iab-IP-AddressToReleaseList-r16 SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressIndex-r16 OPTIONAL, -- Need N

...

}

IAB-IP-AddressConfiguration-r16 ::= SEQUENCE {

iab-IP-AddressIndex-r16 IAB-IP-AddressIndex-r16,

iab-IP-Address-r16 IAB-IP-Address-r16 OPTIONAL, -- Need M

iab-IP-Usage-r16 IAB-IP-Usage-r16 OPTIONAL, -- Need M

iab-donor-DU-BAP-Address-r16 BIT STRING (SIZE(10)) OPTIONAL, -- Need M

...

}

SL-ConfigDedicatedEUTRA-Info-r16 ::= SEQUENCE {

sl-ConfigDedicatedEUTRA-r16 OCTET STRING OPTIONAL, -- Need M

sl-TimeOffsetEUTRA-List-r16 SEQUENCE (SIZE (8)) OF SL-TimeOffsetEUTRA-r16 OPTIONAL -- Need M

}

SL-TimeOffsetEUTRA-r16 ::= ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot625, ms0dot75, ms1, ms1dot25, ms1dot5, ms1dot75,

ms2, ms2dot5, ms3, ms4, ms5, ms6, ms8, ms10, ms20}

-- TAG-RRCRECONFIGURATION-STOP

-- ASN1STOP

|  |
| --- |
| ***RRCReconfiguration-IEs* field descriptions** |
| ***bap-Config***  This field is used to configure the BAP entity for IAB nodes. |
| ***bap-Address***  Indicates the BAP address of an IAB-node. The BAP address of an IAB-node cannot be changed once configured to the BAP entity. |
| ***conditionalReconfiguration***  Configuration of candidate target SpCell(s) and execution condition(s) for conditional handover or conditional PSCell change. For conditional PSCell change, this field may only be present in an *RRCReconfiguration* message for intra-SN PSCell change. The network does not configure a UE with both conditional PCell change and conditional PSCell change simultaneously. The field is absent if any DAPS bearer is configured or if the *masterCellGroup* includes *ReconfigurationWithSync*. For conditional PSCell change, the field is absent if the *secondaryCellGroup* includes *ReconfigurationWithSync*. The *RRCReconfiguration* message contained in *DLInformationTransferMRDC* cannot contain the field *conditionalReconfiguration* for conditional PSCell change. |
| ***daps-SourceRelease***  Indicates to UE that the source cell part of DAPS operation is to be stopped and the source cell part of DAPS configuration is to be released. |
| ***dedicatedNAS-MessageList***  This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list. |
| ***dedicatedPosSysInfoDelivery***  This field is used to transfer *SIBPos* to the UE in RRC\_CONNECTED. |
| ***dedicatedSIB1-Delivery***  This field is used to transfer *SIB1* to the UE. The field has the same values as the corresponding configuration in *servingCellConfigCommon*. |
| ***dedicatedSystemInformationDelivery***  This field is used to transfer *SIB6*, *SIB7*, *SIB8* to the UE with an active BWP with no common serach space configured. For UEs in RRC\_CONNECTED, this field is used to transfer the SIBs requested on-demand. |
| ***defaultUL-BAP-RoutingID***  This field is used for IAB-node to configure the default uplink Routing ID, which is used by IAB-node during IAB-node bootstrapping*,* migration, IAB-MT RRC resume and IAB-MT RRC re-establishment for *F1-C* and *non-F1* traffic. The *defaultUL-BAP-RoutingID* can be (re-)configured when IAB-node IP address for *F1-C* related traffic changes. This field is mandatory only for IAB-node bootstrapping. |
| ***defaultUL-BH-RLC-Channel***  This field is used for IAB-nodes to configure the default uplink BH RLC channel*,* which is used by IAB-nodeduring IAB-node bootstrapping*,* migration, IAB-MT RRC resume and IAB-MT RRC re-establishment *for F1-C and non-F1 traffic*. The *defaultUL-BH-RLC-Channel* can be (re-)configured when IAB-node IP address for *F1-C* related traffic changes, and the new IP address is anchored at a different IAB-donor-DU. This field is mandatory for IAB-node bootstrapping. If the IAB-MT is operating in EN-DC, the default uplink BH RLC channel is referring to an RLC channel on the SCG; Otherwise, it is referring to an RLC channel on the MCG. |
| ***flowControlFeedbackType***  This field is only used for IAB-node that support hop-by-hop flow control to configure the type of flow control feedback. Value *perBH-RLC-Channel* indicates that the IAB-node shall provide flow control feedback per BH RLC channel, value *perRoutingID* indicates that the IAB-node shall provide flow control feedback per routing ID, and value *both* indicates that the IAB-node shall provide flow control feedback both per BH RLC channel and per routing ID. |
| ***fullConfig***  Indicates that the full configuration option is applicable for the *RRCReconfiguration* message for intra-system intra-RAT HO. For inter-RAT HO from E-UTRA to NR, *fullConfig* indicates whether or not delta signalling of SDAP/PDCP from source RAT is applicable. This field is absent if any DAPS bearer is configured or when the *RRCReconfiguration* message is transmitted on SRB3, and in an *RRCReconfiguration* message for SCG contained in another *RRCReconfiguration* message (or *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1. |
| ***iab-IP-Address***  This field is used to provide the IP address information for IAB-node. |
| ***iab-IP-AddressIndex***  This field is used to identify a configuration of an IP address. |
| ***iab-IP-AddressToAddModList***  List of IP addresses allocated for IAB-node to be added and modified. |
| ***iab-IP-AddressToReleaseList***  List of IP address allocated for IAB-node to be released. |
| ***iab-IP-Usage***  This field is used to indicate the usage of the assigned IP address. If this field is not configured, the assigned IP address is used for all traffic. |
| ***iab-donor-DU-BAP-Address***  This field is used to indicate the BAP address of the IAB-donor-DU where the IP address is anchored. |
| ***keySetChangeIndicator***  Indicates whether UE shall derive a new KgNB. If *reconfigurationWithSync* is included, value *true* indicates that a KgNB key is derived from a KAMF key taken into use through the latest successful NAS SMC procedure, or N2 handover procedure with KAMF change, as described in TS 33.501 [11] for KgNB re-keying. Value *false* indicates that the new KgNB key is obtained from the current KgNB key or from the NH as described in TS 33.501 [11]. |
| ***masterCellGroup***  Configuration of master cell group. |
| ***mrdc-ReleaseAndAdd***  This field indicates that the current SCG configuration is released and a new SCG is added at the same time. |
| ***mrdc-SecondaryCellGroup***  Includes an RRC message for SCG configuration in NR-DC or NE-DC. For NR-DC (nr-SCG), *mrdc-SecondaryCellGroup* contains the *RRCReconfiguration* message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields *secondaryCellGroup, otherConfig, conditionalReconfiguration* and *measConfig*.  For NE-DC (eutra-SCG), *mrdc-SecondaryCellGroup* includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration*. |
| ***nas-Container***  This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this field, although it affects activation of AS security after inter-system handover to NR. The content is defined in TS 24.501 [23]. |
| ***needForGapsConfigNR***  Configuration for the UE to report measurement gap requirement information of NR target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message. |
| ***nextHopChainingCount***  Parameter NCC: See TS 33.501 [11] |
| ***onDemandSIB-Request***  If the field is present, the UE is allowed to request SIB(s) on-demand while in RRC\_CONNECTED according to clause 5.2.2.3.5. |
| ***onDemandSIB-RequestProhibitTimer***  Prohibit timer for requesting SIB(s) on-demand while in RRC\_CONNECTED according to clause 5.2.2.3.5. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0dot5 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on. |
| ***otherConfig***  Contains configuration related to other configurations. When configured for the SCG, only fields *drx-PreferenceConfig, maxBW-PreferenceConfig, maxBW-PreferenceConfigFR2-2, maxCC-PreferenceConfig, maxMIMO-LayerPreferenceConfig*, *maxMIMO-LayerPreferenceConfigFR2-2*, *minSchedulingOffsetPreferenceConfig, minSchedulingOffsetPreferenceConfigExt, btNameList, wlanNameList, sensorNameList* and *obtainCommonLocation* can be included. |
| ***radioBearerConfig***  Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. In EN-DC this field may only be present if the *RRCReconfiguration* is transmitted over SRB3. |
| ***radioBearerConfig2***  Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. This field can only be used if the UE supports NR-DC or NE-DC. |
| ***secondaryCellGroup***  Configuration of secondary cell group ((NG)EN-DC or NR-DC). |
| ***Sk-Counter***  A counter used upon initial configuration of S-KgNB or S-KeNB, as well as upon refresh of S-KgNB or S-KeNB. This field is always included either upon initial configuration of an NR SCG or upon configuration of the first RB with *keyToUse* set to *secondary*, whichever happens first. This field is absent if there is neither any NR SCG nor any RB with *keyToUse* set to *secondary*. |
| ***Sl-ConfigDedicatedNR***  This field is used to provide the dedicated configurations for NR sidelink communication. |
| ***Sl-ConfigDedicatedEUTRA-Info***  This field includes the E-UTRA *RRCConnectionReconfiguration* as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA *RRCConnectionReconfiguration* can only includes sidelink related fields for V2X sidelink communication, i.e. *sl-V2X-ConfigDedicated*, *sl-V2X-SPS-Config*, *measConfig* and/or *otherConfig*. |
| ***Sl-TimeOffsetEUTRA***  This field indicates the possible time offset to (de)activation of V2X sidelink transmission after receiving DCI format 3\_1 used for scheduling V2X sidelink communication. Value *ms0dpt75* corresponds to 0.75ms, *ms1* corresponds to 1ms and so on. The network includes this field only when *sl-ConfigDedicatedEUTRA* is configured. |
| ***targetCellSMTC-SCG***  The SSB periodicity/offset/duration configuration of target cell for NR PSCell addition and SN change. When UE receives this field, UE applies the configuration based on the timing reference of NR Pcell for PSCell addition and PSCell change for the case of no reconfiguration with sync of MCG, and UE applies the configuration based on the timing reference of target NR Pcell for the case of reconfiguration with sync of MCG. If both this field and the *smtc* in *secondaryCellGroup* -> *SpCellConfig* -> *reconfigurationWithSync* are absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. |
| ***T316***  Indicates the value for timer T316 as described in clause 7.1. Value *ms50* corresponds to 50 ms, value *ms100* corresponds to 100 ms and so on. This field can be configured only if the UE is configured with split SRB1 or SRB3. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *nonHO* | The field is absent in case of reconfiguration with sync within NR or to NR; otherwise it is optionally present, need N. |
| *securityNASC* | This field is mandatory present in case of inter system handover. Otherwise the field is optionally present, need N. |
| *MasterKeyChange* | This field is mandatory present in case *masterCellGroup* includes *ReconfigurationWithSync* and *RadioBearerConfig* includes *SecurityConfig* with *SecurityAlgorithmConfig*, indicating a change of the AS security algorithms associated to the master key. If *ReconfigurationWithSync* is included for other cases, this field is optionally present, need N. Otherwise the field is absent. |
| *FullConfig* | The field is mandatory present in case of inter-system handover from E-UTRA/EPC to NR. It is optionally present, Need N, during reconfiguration with sync and also in first reconfiguration after reestablishment; or for intra-system handover from E-UTRA/5GC to NR. It is absent otherwise. |
| *SCG* | The field is mandatory present in:  - an *RRCReconfiguration* message contained in an *RRCResume* message (or in an *RRCConnectionResume* message, see TS 36.331 [10]),  - an *RRCReconfiguration* message contained in an *RRCConnectionReconfiguration* message, see TS 36.331 [10], which is contained in *DLInformationTransferMRDC* transmitted on SRB3 (as a response to *ULInformationTransferMRDC* including an *MCGFailureInformation*).  The field is optional present, Need M, in:  - an *RRCReconfiguration* message transmitted on SRB3,  - an *RRCReconfiguration* message contained in another *RRCReconfiguration* message (or in an *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1  - an *RRCReconfiguration* message contained in another *RRCReconfiguration* message which is contained in *DLInformationTransferMRDC* transmitted on SRB3 (as a response to *ULInformationTransferMRDC* including an *MCGFailureInformation*)  Otherwise, the field is absent |

< Unmodified parts omitted >

– *RRCRelease*

The *RRCRelease* message is used to command the release of an RRC connection or the suspension of the RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

***RRCRelease* message**

-- ASN1START

-- TAG-RRCRELEASE-START

RRCRelease ::= SEQUENCE {

rrc-TransactionIdentifier RRC-TransactionIdentifier,

criticalExtensions CHOICE {

rrcRelease RRCRelease-Ies,

criticalExtensionsFuture SEQUENCE {}

}

}

RRCRelease-Ies ::= SEQUENCE {

redirectedCarrierInfo RedirectedCarrierInfo OPTIONAL, -- Need N

cellReselectionPriorities CellReselectionPriorities OPTIONAL, -- Need R

suspendConfig SuspendConfig OPTIONAL, -- Need R

deprioritisationReq SEQUENCE {

deprioritisationType ENUMERATED {frequency, nr},

deprioritisationTimer ENUMERATED {min5, min10, min15, min30}

} OPTIONAL, -- Need N

lateNonCriticalExtension OCTET STRING OPTIONAL,

nonCriticalExtension RRCRelease-v1540-Ies OPTIONAL

}

RRCRelease-v1540-Ies ::= SEQUENCE {

waitTime RejectWaitTime OPTIONAL, -- Need N

nonCriticalExtension RRCRelease-v1610-Ies OPTIONAL

}

RRCRelease-v1610-Ies ::= SEQUENCE {

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

measIdleConfig-r16 SetupRelease {MeasIdleConfigDedicated-r16} OPTIONAL, -- Need M

nonCriticalExtension RRCRelease-v1650-Ies OPTIONAL

}

RRCRelease-v1650-Ies ::= SEQUENCE {

mpsPriorityIndication-r16 ENUMERATED {true} OPTIONAL, -- Cond Redirection2

nonCriticalExtension SEQUENCE {} OPTIONAL

}

RedirectedCarrierInfo ::= CHOICE {

nr CarrierInfoNR,

eutra RedirectedCarrierInfo-EUTRA,

...

}

RedirectedCarrierInfo-EUTRA ::= SEQUENCE {

eutraFrequency ARFCN-ValueEUTRA,

cnType ENUMERATED {epc,fiveGC} OPTIONAL -- Need N

}

CarrierInfoNR ::= SEQUENCE {

carrierFreq ARFCN-ValueNR,

ssbSubcarrierSpacing SubcarrierSpacing,

smtc SSB-MTC OPTIONAL, -- Need S

...

}

SuspendConfig ::= SEQUENCE {

fullI-RNTI I-RNTI-Value,

shortI-RNTI ShortI-RNTI-Value,

ran-PagingCycle PagingCycle,

ran-NotificationAreaInfo RAN-NotificationAreaInfo OPTIONAL, -- Need M

t380 PeriodicRNAU-TimerValue OPTIONAL, -- Need R

nextHopChainingCount NextHopChainingCount,

...

}

PeriodicRNAU-TimerValue ::= ENUMERATED { min5, min10, min20, min30, min60, min120, min360, min720}

CellReselectionPriorities ::= SEQUENCE {

freqPriorityListEUTRA FreqPriorityListEUTRA OPTIONAL, -- Need M

freqPriorityListNR FreqPriorityListNR OPTIONAL, -- Need M

t320 ENUMERATED {min5, min10, min20, min30, min60, min120, min180, spare1} OPTIONAL, -- Need R

...

}

PagingCycle ::= ENUMERATED {rf32, rf64, rf128, rf256}

FreqPriorityListEUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA

FreqPriorityListNR ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityNR

FreqPriorityEUTRA ::= SEQUENCE {

carrierFreq ARFCN-ValueEUTRA,

cellReselectionPriority CellReselectionPriority,

cellReselectionSubPriority CellReselectionSubPriority OPTIONAL -- Need R

}

FreqPriorityNR ::= SEQUENCE {

carrierFreq ARFCN-ValueNR,

cellReselectionPriority CellReselectionPriority,

cellReselectionSubPriority CellReselectionSubPriority OPTIONAL -- Need R

}

RAN-NotificationAreaInfo ::= CHOICE {

cellList PLMN-RAN-AreaCellList,

ran-AreaConfigList PLMN-RAN-AreaConfigList,

...

}

PLMN-RAN-AreaCellList ::= SEQUENCE (SIZE (1.. maxPLMNIdentities)) OF PLMN-RAN-AreaCell

PLMN-RAN-AreaCell ::= SEQUENCE {

plmn-Identity PLMN-Identity OPTIONAL, -- Need S

ran-AreaCells SEQUENCE (SIZE (1..32)) OF CellIdentity

}

PLMN-RAN-AreaConfigList ::= SEQUENCE (SIZE (1..maxPLMNIdentities)) OF PLMN-RAN-AreaConfig

PLMN-RAN-AreaConfig ::= SEQUENCE {

plmn-Identity PLMN-Identity OPTIONAL, -- Need S

ran-Area SEQUENCE (SIZE (1..16)) OF RAN-AreaConfig

}

RAN-AreaConfig ::= SEQUENCE {

trackingAreaCode TrackingAreaCode,

ran-AreaCodeList SEQUENCE (SIZE (1..32)) OF RAN-AreaCode OPTIONAL -- Need R

}

-- TAG-RRCRELEASE-STOP

-- ASN1STOP

|  |
| --- |
| ***RRCRelease-IEs* field descriptions** |
| ***cnType***  Indicate that the UE is redirected to EPC or 5GC. |
| ***deprioritisationReq***  Indicates whether the current frequency or RAT is to be de-prioritised. |
| ***deprioritisationTimer***  Indicates the period for which either the current carrier frequency or NR is deprioritised. Value *minN* corresponds to N minutes. |
| ***measIdleConfig***  Indicates measurement configuration to be stored and used by the UE while in RRC\_IDLE or RRC\_INACTIVE. |
| ***mpsPriorityIndication***  Indicates the UE can set the establishment cause to mps-PriorityAccess for a new connection to a new RAT following a redirect to NR. If the target RAT is E-UTRA, see TS 36.331 [10]. The gNB sets the indication only for UEs authorized to receive MPS treatment as indicated by ARP and/or QoS characteristics at the gNB, and it is applicable only for this instance of release with redirection to carrier/RAT included in the *redirectedCarrierInfo* field in the *RRCRelease* message. |
| ***suspendConfig***  Indicates configuration for the RRC\_INACTIVE state. The network does not configure *suspendConfig* when the network redirect the UE to an inter-RAT carrier frequency or if the UE is configured with a DAPS bearer. |
| ***redirectedCarrierInfo***  Indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an NR or an inter-RAT carrier frequency, by means of cell selection at transition to RRC\_IDLE or RRC\_INACTIVE as specified in TS 38.304 [20]. Based on UE capability, the network may include *redirectedCarrierInfo* in *RRCRelease* message with *suspendConfig* if this message is sent in response to an *RRCResumeRequest* or an *RRCResumeRequest1* which is triggered by the NAS layer (see 5.3.1.4 in TS 24.501 [23]). |
| ***voiceFallbackIndication***  Indicates the RRC release is triggered by EPS fallback for IMS voice as specified in TS 23.502 [43]. |

|  |
| --- |
| ***CarrierInfoNR* field descriptions** |
| ***carrierFreq***  Indicates the redirected NR frequency. |
| ***ssbSubcarrierSpacing***  Subcarrier spacing of SSB in the redirected SSB frequency.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |
| ***smtc***  The SSB periodicity/offset/duration configuration for the redirected SSB frequency. It is based on timing reference of PCell. If the field is absent, the UE uses the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. |

|  |
| --- |
| ***RAN-NotificationAreaInfo* field descriptions** |
| ***cellList***  A list of cells configured as RAN area. |
| ***ran-AreaConfigList***  A list of RAN area codes or RA code(s) as RAN area. |

|  |
| --- |
| ***PLMN-RAN-AreaConfig* field descriptions** |
| ***plmn-Identity***  PLMN Identity to which the cells in *ran-Area* belong. If the field is absent the UE not in SNPN access mode uses the ID of the registered PLMN. This field is not included for UE in SNPN access mode (for UE in SNPN access mode the *ran-Area* always belongs to the registered SNPN). |
| ***ran-AreaCodeList***  The total number of RAN-AreaCodes of all PLMNs does not exceed 32. |
| ***ran-Area***  Indicates whether TA code(s) or RAN area code(s) are used for the RAN notification area. The network uses only TA code(s) or both TA code(s) and RAN area code(s) to configure a UE. The total number of TACs across all PLMNs does not exceed 16. |

|  |
| --- |
| ***PLMN-RAN-AreaCell* field descriptions** |
| ***plmn-Identity***  PLMN Identity to which the cells in *ran-AreaCells* belong. If the field is absent the UE not in SNPN access mode uses the ID of the registered PLMN. This field is not included for UE in SNPN access mode (for UE in SNPN access mode the *ran-AreaCells* always belongs to the registered SNPN). |
| ***ran-AreaCells***  The total number of cells of all PLMNs does not exceed 32. |

|  |
| --- |
| ***SuspendConfig* field descriptions** |
| ***ran-NotificationAreaInfo***  Network ensures that the UE in RRC\_INACTIVE always has a valid *ran-NotificationAreaInfo*. |
| ***ran-PagingCycle***  Refers to the UE specific cycle for RAN-initiated paging. Value *rf32* corresponds to 32 radio frames, value *rf64* corresponds to 64 radio frames and so on. |
| ***t380***  Refers to the timer that triggers the periodic RNAU procedure in UE. Value *min5* corresponds to 5 minutes, value *min10* corresponds to 10 minutes and so on. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Redirection2* | The field is optionally present, Need R, if *redirectedCarrierInfo* is included; otherwise the field is not present. |

< Unmodified parts omitted >

– *UEAssistanceInformation*

The *UEAssistanceInformation* message is used for the indication of UE assistance information to the network.

Signalling radio bearer: SRB1, SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

***UEAssistanceInformation message***

-- ASN1START

-- TAG-UEASSISTANCEINFORMATION-START

UEAssistanceInformation ::= SEQUENCE {

criticalExtensions CHOICE {

ueAssistanceInformation UEAssistanceInformation-IEs,

criticalExtensionsFuture SEQUENCE {}

}

}

UEAssistanceInformation-IEs ::= SEQUENCE {

delayBudgetReport DelayBudgetReport OPTIONAL,

lateNonCriticalExtension OCTET STRING OPTIONAL,

nonCriticalExtension UEAssistanceInformation-v1540-IEs OPTIONAL

}

DelayBudgetReport::= CHOICE {

type1 ENUMERATED {

msMinus1280, msMinus640, msMinus320, msMinus160,msMinus80, msMinus60, msMinus40,

msMinus20, ms0, ms20,ms40, ms60, ms80, ms160, ms320, ms640, ms1280},

...

}

UEAssistanceInformation-v1540-IEs ::= SEQUENCE {

overheatingAssistance OverheatingAssistance OPTIONAL,

nonCriticalExtension UEAssistanceInformation-v1610-IEs OPTIONAL

}

OverheatingAssistance ::= SEQUENCE {

reducedMaxCCs ReducedMaxCCs-r16 OPTIONAL,

reducedMaxBW-FR1 ReducedMaxBW-FRx-r16 OPTIONAL,

reducedMaxBW-FR2 ReducedMaxBW-FRx-r16 OPTIONAL,

reducedMaxMIMO-LayersFR1 SEQUENCE {

reducedMIMO-LayersFR1-DL MIMO-LayersDL,

reducedMIMO-LayersFR1-UL MIMO-LayersUL

} OPTIONAL,

reducedMaxMIMO-LayersFR2 SEQUENCE {

reducedMIMO-LayersFR2-DL MIMO-LayersDL,

reducedMIMO-LayersFR2-UL MIMO-LayersUL

} OPTIONAL

}

OverheatingAssistance-r17 ::= SEQUENCE {

reducedMaxBW-FR2-2-r17 SEQUENCE {

reducedBW-FR2-2-DL-r17 ReducedAggregatedBandwidth-r17 OPTIONAL,

reducedBW-FR2-2-UL-r17 ReducedAggregatedBandwidth-r17 OPTIONAL

} OPTIONAL,

reducedMaxMIMO-LayersFR2-2 SEQUENCE {

reducedMIMO-LayersFR2-2-DL MIMO-LayersDL,

reducedMIMO-LayersFR2-2-UL MIMO-LayersUL

} OPTIONAL

}

ReducedAggregatedBandwidth ::= ENUMERATED {mhz0, mhz10, mhz20, mhz30, mhz40, mhz50, mhz60, mhz80, mhz100, mhz200, mhz300, mhz400}

ReducedAggregatedBandwidth-r17 ::= ENUMERATED {mhz0, mhz100, mhz200, mhz400, mhz800, mhz1200, mhz1600, mhz2000}

UEAssistanceInformation-v1610-IEs ::= SEQUENCE {

idc-Assistance-r16 IDC-Assistance-r16 OPTIONAL,

drx-Preference-r16 DRX-Preference-r16 OPTIONAL,

maxBW-Preference-r16 MaxBW-Preference-r16 OPTIONAL,

maxCC-Preference-r16 MaxCC-Preference-r16 OPTIONAL,

maxMIMO-LayerPreference-r16 MaxMIMO-LayerPreference-r16 OPTIONAL,

minSchedulingOffsetPreference-r16 MinSchedulingOffsetPreference-r16 OPTIONAL,

releasePreference-r16 ReleasePreference-r16 OPTIONAL,

sl-UE-AssistanceInformationNR-r16 SL-UE-AssistanceInformationNR-r16 OPTIONAL,

referenceTimeInfoPreference-r16 BOOLEAN OPTIONAL,

nonCriticalExtension UEAssistanceInformation-v17xy-IEs OPTIONAL

}

UEAssistanceInformation-v17xy-IEs ::= SEQUENCE {

overheatingAssistance-r17 OverheatingAssistance-r17 OPTIONAL,

maxBW-PreferenceFR2-2-r17 MaxBW-PreferenceFR2-2-r17 OPTIONAL,

maxMIMO-LayerPreferenceFR2-2-r17 MaxMIMO-LayerPreferenceFR2-2-r17 OPTIONAL,

minSchedulingOffsetPreferenceExt-r17 MinSchedulingOffsetPreferenceExt-r17 OPTIONAL,

nonCriticalExtension SEQUENCE {} OPTIONAL

}

IDC-Assistance-r16 ::= SEQUENCE {

affectedCarrierFreqList-r16 AffectedCarrierFreqList-r16 OPTIONAL,

affectedCarrierFreqCombList-r16 AffectedCarrierFreqCombList-r16 OPTIONAL,

...

}

AffectedCarrierFreqList-r16 ::= SEQUENCE (SIZE (1.. maxFreqIDC-r16)) OF AffectedCarrierFreq-r16

AffectedCarrierFreq-r16 ::= SEQUENCE {

carrierFreq-r16 ARFCN-ValueNR,

interferenceDirection-r16 ENUMERATED {nr, other, both, spare}

}

AffectedCarrierFreqCombList-r16 ::= SEQUENCE (SIZE (1..maxCombIDC-r16)) OF AffectedCarrierFreqComb-r16

AffectedCarrierFreqComb-r16 ::= SEQUENCE {

affectedCarrierFreqComb-r16 SEQUENCE (SIZE (2..maxNrofServingCells)) OF ARFCN-ValueNR OPTIONAL,

victimSystemType-r16 VictimSystemType-r16

}

VictimSystemType-r16 ::= SEQUENCE {

gps-r16 ENUMERATED {true} OPTIONAL,

glonass-r16 ENUMERATED {true} OPTIONAL,

bds-r16 ENUMERATED {true} OPTIONAL,

galileo-r16 ENUMERATED {true} OPTIONAL,

navIC-r16 ENUMERATED {true} OPTIONAL,

wlan-r16 ENUMERATED {true} OPTIONAL,

bluetooth-r16 ENUMERATED {true} OPTIONAL,

...

}

DRX-Preference-r16 ::= SEQUENCE {

preferredDRX-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} OPTIONAL,

preferredDRX-LongCycle-r16 ENUMERATED {

ms10, ms20, ms32, ms40, ms60, ms64, ms70, ms80, ms128, ms160, ms256, ms320, ms512,

ms640, ms1024, ms1280, ms2048, ms2560, ms5120, ms10240, spare12, spare11, spare10,

spare9, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL,

preferredDRX-ShortCycle-r16 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 } OPTIONAL,

preferredDRX-ShortCycleTimer-r16 INTEGER (1..16) OPTIONAL

}

MaxBW-Preference-r16 ::= SEQUENCE {

reducedMaxBW-FR1-r16 ReducedMaxBW-FRx-r16 OPTIONAL,

reducedMaxBW-FR2-r16 ReducedMaxBW-FRx-r16 OPTIONAL

}

MaxBW-PreferenceFR2-2-r17 ::= SEQUENCE {

reducedMaxBW-FR2-2-r17 SEQUENCE {

reducedBW-FR2-2-DL-r17 ReducedAggregatedBandwidth-r17 OPTIONAL,

reducedBW-FR2-2-UL-r17 ReducedAggregatedBandwidth-r17 OPTIONAL

} OPTIONAL

}

MaxCC-Preference-r16 ::= SEQUENCE {

reducedMaxCCs-r16 ReducedMaxCCs-r16 OPTIONAL

}

MaxMIMO-LayerPreference-r16 ::= SEQUENCE {

reducedMaxMIMO-LayersFR1-r16 SEQUENCE {

reducedMIMO-LayersFR1-DL-r16 INTEGER (1..8),

reducedMIMO-LayersFR1-UL-r16 INTEGER (1..4)

} OPTIONAL,

reducedMaxMIMO-LayersFR2-r16 SEQUENCE {

reducedMIMO-LayersFR2-DL-r16 INTEGER (1..8),

reducedMIMO-LayersFR2-UL-r16 INTEGER (1..4)

} OPTIONAL

}

MaxMIMO-LayerPreferenceFR2-2-r17 ::= SEQUENCE {

reducedMaxMIMO-LayersFR2-2-r17 SEQUENCE {

reducedMIMO-LayersFR2-2-DL-r17 INTEGER (1..8),

reducedMIMO-LayersFR2-2-UL-r17 INTEGER (1..4)

} OPTIONAL

}

MinSchedulingOffsetPreference-r16 ::= SEQUENCE {

preferredK0-r16 SEQUENCE {

preferredK0-SCS-15kHz-r16 ENUMERATED {sl1, sl2, sl4, sl6} OPTIONAL,

preferredK0-SCS-30kHz-r16 ENUMERATED {sl1, sl2, sl4, sl6} OPTIONAL,

preferredK0-SCS-60kHz-r16 ENUMERATED {sl2, sl4, sl8, sl12} OPTIONAL,

preferredK0-SCS-120kHz-r16 ENUMERATED {sl2, sl4, sl8, sl12} OPTIONAL

} OPTIONAL,

preferredK2-r16 SEQUENCE {

preferredK2-SCS-15kHz-r16 ENUMERATED {sl1, sl2, sl4, sl6} OPTIONAL,

preferredK2-SCS-30kHz-r16 ENUMERATED {sl1, sl2, sl4, sl6} OPTIONAL,

preferredK2-SCS-60kHz-r16 ENUMERATED {sl2, sl4, sl8, sl12} OPTIONAL,

preferredK2-SCS-120kHz-r16 ENUMERATED {sl2, sl4, sl8, sl12} OPTIONAL

} OPTIONAL

}

MinSchedulingOffsetPreferenceExt-r17 ::= SEQUENCE {

preferredK0-r17 SEQUENCE {

preferredK0-SCS-480kHz-r17 ENUMERATED {sl8, sl16, sl32, sl48} OPTIONAL,

preferredK0-SCS-960kHz-r17 ENUMERATED {sl8, sl16, sl32, sl48} OPTIONAL

} OPTIONAL,

preferredK2-r17 SEQUENCE {

preferredK2-SCS-480kHz-r17 ENUMERATED {sl8, sl16, sl32, sl48} OPTIONAL,

preferredK2-SCS-960kHz-r17 ENUMERATED {sl8, sl16, sl32, sl48} OPTIONAL

} OPTIONAL

}

ReleasePreference-r16 ::= SEQUENCE {

preferredRRC-State-r16 ENUMERATED {idle, inactive, connected, outOfConnected}

}

ReducedMaxBW-FRx-r16 ::= SEQUENCE {

reducedBW-DL-r16 ReducedAggregatedBandwidth,

reducedBW-UL-r16 ReducedAggregatedBandwidth

}

ReducedMaxCCs-r16 ::= SEQUENCE {

reducedCCsDL-r16 INTEGER (0..31),

reducedCCsUL-r16 INTEGER (0..31)

}

SL-UE-AssistanceInformationNR-r16 ::= SEQUENCE (SIZE (1..maxNrofTrafficPattern-r16)) OF SL-TrafficPatternInfo-r16

SL-TrafficPatternInfo-r16::= SEQUENCE {

trafficPeriodicity-r16 ENUMERATED {ms20, ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000},

timingOffset-r16 INTEGER (0..10239),

messageSize-r16 BIT STRING (SIZE (8)),

sl-QoS-FlowIdentity-r16 SL-QoS-FlowIdentity-r16

}

-- TAG-UEASSISTANCEINFORMATION-STOP

-- ASN1STOP

Editor’s note: The value range for ReducedAggregatedBandwidth-r17 needs RAN4 confirmation

Editor’s note: The value range for preferred K0/K2 for SCS 960 kHz needs RAN1 confirmation

| ***UEAssistanceInformation* field descriptions** |
| --- |
| ***affectedCarrierFreqList***  Indicates a list of NR carrier frequencies that are affected by IDC problem. |
| ***affectedCarrierFreqCombList***  Indicates a list of NR carrier frequencie combinations that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from NR when configured with UL CA. |
| ***delayBudgetReport***  Indicates the UE-preferred adjustment to connected mode DRX. |
| ***interferenceDirection***  Indicates the direction of IDC interference. Value *nr* indicates that only NR is victim of IDC interference, value *other* indicates that only another radio is victim of IDC interference and value *both* indicates that both NR and another radio are victims of IDC interference. The other radio refers to either the ISM radio or GNSS (see TR 36.816 [44]). |
| ***minSchedulingOffsetPreference***  Indicates the UE's preferences on *minimumSchedulingOffset* of cross-slot scheduling for power saving. |
| ***minSchedulingOffsetPreferenceExt***  Indicates the UE's preferences on *minimumSchedulingOffset* of cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz. |
| ***preferredDRX-InactivityTimer***  Indicates the UE's preferred DRX inactivity timer length for power saving. Value in ms (milliSecond). *ms0* corresponds to 0, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the DRX inactivity timer. If secondary DRX group is configured, the *preferredDRX-InactivityTimer* only applies to the default DRX group. |
| ***preferredDRX-LongCycle***  Indicates the UE's preferred long DRX cycle length for power saving. Value in ms. *ms10* corresponds to 10ms, *ms20* corresponds to 20 ms, *ms32* corresponds to 32 ms, and so on. If *preferredDRX-ShortCycle* is provided, the value of *preferredDRX-LongCycle* shall be a multiple of the *preferredDRX-ShortCycle* value. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the long DRX cycle. |
| ***preferredDRX-ShortCycle***  Indicates the UE's preferred short DRX cycle length for power saving. Value in ms. *ms2* corresponds to 2ms, *ms3* corresponds to 3 ms, *ms4* corresponds to 4 ms, and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the short DRX cycle. |
| ***preferredDRX-ShortCycleTimer***  Indicates the UE's preferred short DRX cycle timer for power saving. Value in multiples of *preferredDRX-ShortCycle*. A value of 1 corresponds to *preferredDRX-ShortCycle*, a value of 2 corresponds to 2 \* *preferredDRX-ShortCycle* and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the short DRX cycle timer. A preference for the short DRX cycle is indicated when a preference for the short DRX cycle timer is indicated. |
| ***preferredK0***  Indicates the UE's preferred value of *k0* (slot offset between DCI and its scheduled PDSCH - see TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling for power saving. Value is defined for each subcarrier spacing (numerology) in units of slots. *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, *sl4* corresponds to 4 slots, and so on. If a value for a subcarrier spacing is absent, it is interpreted as the UE having no preference on *k0* for cross-slot scheduling for that subcarrier spacing. If the field is absent from the *MinSchedulingOffsetPreference* IE, it is interpreted as the UE having no preference on *k0* for cross-slot scheduling. |
| ***preferredK2***  Indicates the UE's preferred value of *k2* (slot offset between DCI and its scheduled PUSCH - see TS 38.214 [19], clause 6.1.2.1) for cross-slot scheduling for power saving. Value is defined for each subcarrier spacing (numerology) in units of slots. *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, *sl4* corresponds to 4 slots, and so on. If a value for a subcarrier spacing is absent, it is interpreted as the UE having no preference on *k2* for cross-slot scheduling for that subcarrier spacing. If the field is absent from the *MinSchedulingOffsetPreference* IE, it is interpreted as the UE having no preference on *k2* for cross-slot scheduling. |
| ***preferredRRC-State***  Indicates the UE's preferred RRC state. The value *idle* is indicated if the UE prefers to be released from RRC\_CONNECTED and transition to RRC\_IDLE. The value *inactive* is indicated if the UE prefers to be released from RRC\_CONNECTED and transition to RRC\_INACTIVE. The value *connected* is indicated if the UE prefers to revert an earlier indication to leave RRC\_CONNECTED state. The value *outOfConnected* is indicated if the UE prefers to be released from RRC\_CONNECTED and has no preferred RRC state to transition to. The value *connected* can only be indicated if the UE is configured with *connectedReporting*. |
| ***reducedBW-FR1***  Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR1, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR1. The aggregated bandwidth across all downlink carrier(s) of FR1 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR1. The aggregated bandwidth across all uplink carrier(s) of FR1 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR1. If the field is absent from the *MaxBW-Preference* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR1.  When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR1 of both the NR MCG and the SCG. This maximum aggregated bandwidth only includes carriers of FR1 of the SCG in (NG)EN-DC. Value *mhz0* is not used when indicated to address overheating.  When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR1 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings. |
| ***reducedBW-FR2***  Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR2-1, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR2-1. The aggregated bandwidth across all downlink carrier(s) of FR2-1 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR2-1. The aggregated bandwidth across all uplink carrier(s) of FR2 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR2-1. If the field is absent from the *MaxBW-Preference* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR2-1.  When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR2 of both the NR MCG and the NR SCG. This maximum aggregated bandwidth only includes carriers of FR2-1 of the SCG in (NG)EN-DC.  When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR2-1 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings. |
| ***reducedMaxBW-FR2-2***  Indicates the ’UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR2-2, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR2-2. The aggregated bandwidth across all downlink carrier(s) of FR2-2 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR2-2. The aggregated bandwidth across all uplink carrier(s) of FR2-2 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR2-2. If the field is absent from the *MaxBW-PreferenceFR2-2* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR2-2.  When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR2-2 of both the NR MCG and the NR SCG.  When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR2-2 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings. |
| ***reducedCCsDL***  Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink SCells indicated by the field, to address overheating or power saving.  When indicated to address overheating, this maximum number includes both SCells of the NR MCG and PSCell/SCells of the SCG. This maximum number only includes PSCell/SCells of the SCG in (NG)EN-DC.  When indicated to address power saving, this maximum number includes PSCell/SCells of the cell group that this UE assistance information is associated with. The maximum number of downlink SCells can only range up to the current active configuration when indicated to address power savings. |
| ***reducedCCsUL***  Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink SCells indicated by the field, to address overheating or power saving.  When indicated to address overheating, this maximum number includes both SCells of the NR MCG and PSCell/SCells of the SCG. This maximum number only includes PSCell/SCells of the SCG in (NG)EN-DC.  When indicated to address power saving, this maximum number includes PSCell/SCells of the cell group that this UE assistance information is associated with. The maximum number of uplink SCells can only range up to the current active configuration when indicated to address power savings. |
| ***reducedMIMO-LayersFR1-DL***  Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR1. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR1 in the cell group when indicated to address power savings. |
| ***reducedMIMO-LayersFR1-UL***  Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR1. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR1 in the cell group when indicated to address power savings. |
| ***reducedMIMO-LayersFR2-DL***  Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR2-1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-1. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR2-1 in the cell group when indicated to address power savings. |
| ***reducedMIMO-LayersFR2-UL***  Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR2-1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-1. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR2-1 in the cell group when indicated to address power savings. |
| ***reducedMIMO-LayersFR2-2-DL***  Indicates the ’UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR2-2 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-2. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR2-2 in the cell group when indicated to address power savings. |
| ***reducedMIMO-LayersFR2-2-UL***  Indicates the ’UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR2-2 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-2. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR2-2 in the cell group when indicated to address power savings. |
| ***referenceTimeInfoPreference***  Indicates whether the UE prefers being provisioned with the timing information specified in the IE *ReferenceTimeInfo*. |
| ***sl-QoS-FlowIdentity***  This identity uniquely identifies one sidelink QoS flow between the UE and the network in the scope of UE, which is unique for different destination and cast type. |
| ***sl-UE-AssistanceInformationNR***  Indicates the traffic characteristic of sidelink logical channel(s), specified in the IE *SL-TrafficPatternInfo,* that are setup for NR sidelink communication. |
| ***type1***  Indicates the preferred amount of increment/decrement to the long DRX cycle length with respect to the current configuration. Value in number of milliseconds. Value *ms40* corresponds to 40 milliseconds, *msMinus40* corresponds to -40 milliseconds and so on. |
| ***victimSystemType***  Indicate the list of victim system types to which IDC interference is caused from NR when configured with UL CA. Value *gps*, *glonass*, *bds*, *galileo* and *navIC* indicates the type of GNSS. Value *wlan* indicates WLAN and value *bluetooth* indicates Bluetooth. |

|  |
| --- |
| ***SL-TrafficPatternInfo field descriptions*** |
| ***messageSize***  Indicates the maximum TB size based on the observed traffic pattern. The value refers to the index of TS 38.321 [3], table 6.1.3.1-2. |
| ***timingOffset***  This field indicates the estimated timing for a packet arrival in a sidelink logical channel. Specifically, the value indicates the timing offset with respect to subframe#0 of SFN#0 in milliseconds. |
| ***trafficPeriodicity***  This field indicates the estimated data arrival periodicity in a sidelink logical channel. Value ms20 corresponds to 20 ms, ms50 corresponds to 50 ms and so on. |

< Unmodified parts omitted >

6.3.1 System information blocks

< Unmodified parts omitted >

– *SIB4*

*SIB4* contains information relevant for inter-frequency cell re-selection (i.e. information about other NR frequencies and inter-frequency neighbouring cells relevant for cell re-selection), which can also be used for NR idle/inactive measurements. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

***SIB4* information element**

-- ASN1START

-- TAG-SIB4-START

SIB4 ::= SEQUENCE {

interFreqCarrierFreqList InterFreqCarrierFreqList,

lateNonCriticalExtension OCTET STRING OPTIONAL,

...,

[[

interFreqCarrierFreqList-v1610 InterFreqCarrierFreqList-v1610 OPTIONAL -- Need R

]]

}

InterFreqCarrierFreqList ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo

InterFreqCarrierFreqList-v1610 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1610

InterFreqCarrierFreqInfo ::= SEQUENCE {

dl-CarrierFreq ARFCN-ValueNR,

frequencyBandList MultiFrequencyBandListNR-SIB OPTIONAL, -- Cond Mandatory

frequencyBandListSUL MultiFrequencyBandListNR-SIB OPTIONAL, -- Need R

nrofSS-BlocksToAverage INTEGER (2..maxNrofSS-BlocksToAverage) OPTIONAL, -- Need S

absThreshSS-BlocksConsolidation ThresholdNR OPTIONAL, -- Need S

smtc SSB-MTC OPTIONAL, -- Need S

ssbSubcarrierSpacing SubcarrierSpacing,

ssb-ToMeasure SSB-ToMeasure OPTIONAL, -- Need S

deriveSSB-IndexFromCell BOOLEAN,

ss-RSSI-Measurement SS-RSSI-Measurement OPTIONAL,

q-RxLevMin Q-RxLevMin,

q-RxLevMinSUL Q-RxLevMin OPTIONAL, -- Need R

q-QualMin Q-QualMin OPTIONAL, -- Need S

p-Max P-Max OPTIONAL, -- Need S

t-ReselectionNR T-Reselection,

t-ReselectionNR-SF SpeedStateScaleFactors OPTIONAL, -- Need S

threshX-HighP ReselectionThreshold,

threshX-LowP ReselectionThreshold,

threshX-Q SEQUENCE {

threshX-HighQ ReselectionThresholdQ,

threshX-LowQ ReselectionThresholdQ

} OPTIONAL, -- Cond RSRQ

cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need R

cellReselectionSubPriority CellReselectionSubPriority OPTIONAL, -- Need R

q-OffsetFreq Q-OffsetRange DEFAULT dB0,

interFreqNeighCellList InterFreqNeighCellList OPTIONAL, -- Need R

interFreqBlackCellList InterFreqBlackCellList OPTIONAL, -- Need R

...

}

InterFreqCarrierFreqInfo-v1610 ::= SEQUENCE {

interFreqNeighCellList-v1610 InterFreqNeighCellList-v1610 OPTIONAL, -- Need R

smtc2-LP-r16 SSB-MTC2-LP-r16 OPTIONAL, -- Need R

interFreqWhiteCellList-r16 InterFreqWhiteCellList-r16 OPTIONAL, -- Cond SharedSpectrum2

ssb-PositionQCL-Common-r16 SSB-PositionQCL-Relation-r16 OPTIONAL, -- Cond SharedSpectrum

interFreqCAG-CellList-r16 SEQUENCE (SIZE (1..maxPLMN)) OF InterFreqCAG-CellListPerPLMN-r16 OPTIONAL -- Need R

}

InterFreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo

InterFreqNeighCellList-v1610 ::= SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo-v1610

InterFreqNeighCellInfo ::= SEQUENCE {

physCellId PhysCellId,

q-OffsetCell Q-OffsetRange,

q-RxLevMinOffsetCell INTEGER (1..8) OPTIONAL, -- Need R

q-RxLevMinOffsetCellSUL INTEGER (1..8) OPTIONAL, -- Need R

q-QualMinOffsetCell INTEGER (1..8) OPTIONAL, -- Need R

...

}

InterFreqNeighCellInfo-v1610 ::= SEQUENCE {

ssb-PositionQCL-r16 SSB-PositionQCL-Relation-r16 OPTIONAL -- Cond SharedSpectrum2

}

InterFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PCI-Range

InterFreqWhiteCellList-r16 ::= SEQUENCE (SIZE (1..maxCellWhite)) OF PCI-Range

InterFreqCAG-CellListPerPLMN-r16 ::= SEQUENCE {

plmn-IdentityIndex-r16 INTEGER (1..maxPLMN),

cag-CellList-r16 SEQUENCE (SIZE (1..maxCAG-Cell-r16)) OF PCI-Range

}

-- TAG-SIB4-STOP

-- ASN1STOP

| ***SIB4* field descriptions** |
| --- |
| ***absThreshSS-BlocksConsolidation***  Threshold for consolidation of L1 measurements per RS index. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20]. |
| ***deriveSSB-IndexFromCell***  This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14]. |
| ***dl-CarrierFreq***  This field indicates center frequency of the SS block of the neighbour cells, where the frequency corresponds to a GSCN value as specified in TS 38.101-1 [15]. |
| ***frequencyBandList***  Indicates the list of frequency bands for which the NR cell reselection parameters apply. |
| ***interFreqBlackCellList***  List of blacklisted inter-frequency neighbouring cells. |
| ***interFreqCAG-CellList***  List of inter-frequency neighbouring CAG cells (as defined in TS 38.304 [20] per PLMN. |
| ***interFreqCarrierFreqList***  List of neighbouring carrier frequencies and frequency specific cell re-selection information. If *iinterFreqCarrierFreqList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *interFreqCarrierFreqList* (without suffix). |
| ***interFreqNeighCellList***  List of inter-frequency neighbouring cells with specific cell re-selection parameters. If *interFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *interFreqNeighCellList* (without suffix). |
| ***interFreqWhiteCellList***  List of whitelisted inter-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4. |
| ***nrofSS-BlocksToAverage***  Number of SS blocks to average for cell measurement derivation. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20]. |
| ***p-Max***  Value in dBm applicable for the neighbouring NR cells on this carrier frequency. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63]. |
| ***q-OffsetCell***  Parameter "Qoffsets,n" in TS 38.304 [20]. |
| ***q-OffsetFreq***  Parameter "Qoffsetfrequency" in TS 38.304 [20]. |
| ***q-QualMin***  Parameter "Qqualmin" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of negative infinity for Qqualmin. |
| ***q-QualMinOffsetCell***  Parameter "Qqualminoffsetcell" in TS 38.304 [20]. Actual value Qqualminoffsetcell = field value [dB]. |
| ***q-RxLevMin***  Parameter "Qrxlevmin" in TS 38.304 [20]. |
| ***q-RxLevMinOffsetCell***  Parameter "Qrxlevminoffsetcell" in TS 38.304 [20]. Actual value Qrxlevminoffsetcell = field value \* 2 [dB]. |
| ***q-RxLevMinOffsetCellSUL***  Parameter "QrxlevminoffsetcellSUL" in TS 38.304 [20]. Actual value QrxlevminoffsetcellSUL = field value \* 2 [dB]. |
| ***q-RxLevMinSUL***  Parameter "Qrxlevmin" in TS 38.304 [20]. |
| ***smtc***  Measurement timing configuration for inter-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms in this frequency. |
| ***smtc2-LP***  Measurement timing configuration for inter-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *InterFreqCarrierFreqInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *InterFreqCarrierFreqInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the inter-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no inter-frequency neighbour cells with a Long Periodicity. |
| ***ssb-PositionQCL***  Indicates the QCL relation between SS/PBCH blocks for a specific neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the common value signalled by *ssb-PositionQCL-Common* in *SIB4* for the indicated cell. |
| ***ssb-PositionQCL-Common***  Indicates the QCL relation between SS/PBCH blocks for inter-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1. |
| ***ssb-ToMeasure***  The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks. |
| ***ssbSubcarrierSpacing***  Subcarrier spacing of SSB.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |
| ***threshX-HighP***  Parameter "ThreshX, HighP" in TS 38.304 [20]. |
| ***threshX-HighQ***  Parameter "ThreshX, HighQ" in TS 38.304 [20]. |
| ***threshX-LowP***  Parameter "ThreshX, LowP" in TS 38.304 [20]. |
| ***threshX-LowQ***  Parameter "ThreshX, LowQ" in TS 38.304 [20]. |
| ***t-ReselectionNR***  Parameter "TreselectionNR" in TS 38.304 [20]. |
| ***t-ReselectionNR-SF***  Parameter "Speed dependent ScalingFactor for TreselectionNR" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20]. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Mandatory* | The field is mandatory present in SIB4. |
| *RSRQ* | The field is mandatory present if *threshServingLowQ* is present in *SIB2*; otherwise it is absent. |
| *SharedSpectrum* | This field is mandatory present if this inter-frequency operates with shared spectrum channel access. Otherwise, it is absent, Need R. |
| *SharedSpectrum2* | The field is optional present, Need R, if this inter-frequency or neighbor cell operates with shared spectrum channel access. Otherwise, it is absent, Need R. |

< Unmodified parts omitted >

6.3.2 Radio resource control information elements

< Unmodified parts omitted >

*– BeamFailureRecoveryConfig*

The IE *BeamFailureRecoveryConfig* is used to configure the UE with RACH resources and candidate beams for beam failure recovery in case of beam failure detection. See also TS 38.321 [3], clause 5.1.1.

***BeamFailureRecoveryConfig* information element**

-- ASN1START

-- TAG-BEAMFAILURERECOVERYCONFIG-START

BeamFailureRecoveryConfig ::= SEQUENCE {

rootSequenceIndex-BFR INTEGER (0..137) OPTIONAL, -- Need M

rach-ConfigBFR RACH-ConfigGeneric OPTIONAL, -- Need M

rsrp-ThresholdSSB RSRP-Range OPTIONAL, -- Need M

candidateBeamRSList SEQUENCE (SIZE(1..maxNrofCandidateBeams)) OF PRACH-ResourceDedicatedBFR OPTIONAL, -- Need M

ssb-perRACH-Occasion ENUMERATED {oneEighth, oneFourth, oneHalf, one, two,

four, eight, sixteen} OPTIONAL, -- Need M

ra-ssb-OccasionMaskIndex INTEGER (0..15) OPTIONAL, -- Need M

recoverySearchSpaceId SearchSpaceId OPTIONAL, -- Need R

ra-Prioritization RA-Prioritization OPTIONAL, -- Need R

beamFailureRecoveryTimer ENUMERATED {ms10, ms20, ms40, ms60, ms80, ms100, ms150, ms200} OPTIONAL, -- Need M

...,

[[

msg1-SubcarrierSpacing SubcarrierSpacing OPTIONAL -- Need M

]],

[[

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

candidateBeamRSListExt-v1610 SetupRelease{ CandidateBeamRSListExt-r16 } OPTIONAL -- Need M

]],

[[

spCell-BFR-CBRA-r16 ENUMERATED {true} OPTIONAL -- Need R

]]

}

PRACH-ResourceDedicatedBFR ::= CHOICE {

ssb BFR-SSB-Resource,

csi-RS BFR-CSIRS-Resource

}

BFR-SSB-Resource ::= SEQUENCE {

ssb SSB-Index,

ra-PreambleIndex INTEGER (0..63),

...

}

BFR-CSIRS-Resource ::= SEQUENCE {

csi-RS NZP-CSI-RS-ResourceId,

ra-OccasionList SEQUENCE (SIZE(1..maxRA-OccasionsPerCSIRS)) OF INTEGER (0..maxRA-Occasions-1) OPTIONAL, -- Need R

ra-PreambleIndex INTEGER (0..63) OPTIONAL, -- Need R

...

}

CandidateBeamRSListExt-r16::= SEQUENCE (SIZE(1.. maxNrofCandidateBeamsExt-r16)) OF PRACH-ResourceDedicatedBFR

-- TAG-BEAMFAILURERECOVERYCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***BeamFailureRecoveryConfig* field descriptions** |
| ***beamFailureRecoveryTimer***  Timer for beam failure recovery timer. Upon expiration of the timer the UE does not use CFRA for BFR. Value in ms. Value *ms10* corresponds to 10 ms, value *ms20* corresponds to 20 ms, and so on. |
| ***candidateBeamRSList, candidateBeamRSListExt-v1610***  Set of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery and the associated RA parameters. This set includes all elements of *candidateBeamRSList* (without suffix) and all elements of *candidateBeamRSListExt-v1610*. The UE maintains *candidateBeamRSList* and *candidateBeamRSListExt-v1610* separately: Receiving *candidateBeamRSListExt-v1610* set to *release* releases only the entries that were configured by *candidateBeamRSListExt-v1610*, and receiving *candidateBeamRSListExt-v1610* set to *setup* replaces only the entries that were configured by *candidateBeamRSListExt-v1610* with the newly signalled entries. The network configures these reference signals to be within the linked DL BWP (i.e., within the DL BWP with the same *bwp-Id*) of the UL BWP in which the *BeamFailureRecoveryConfig* is provided. |
| ***msg1-SubcarrierSpacing***  Subcarrier spacing for contention free beam failure recovery (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 |
| ***rsrp-ThresholdSSB***  L1-RSRP threshold used for determining whether a candidate beam may be used by the UE to attempt contention free random access to recover from beam failure (see TS 38.213 [13], clause 6). |
| ***ra-prioritization***  Parameters which apply for prioritized random access procedure for BFR (see TS 38.321 [3], clause 5.1.1). |
| ***ra-PrioritizationTwoStep***  Parameters which apply for prioritized 2-step random access procedure for BFR (see TS 38.321 [3], clause 5.1.1). |
| ***ra-ssb-OccasionMaskIndex***  Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources. |
| ***rach-ConfigBFR***  Configuration of random access parameters for BFR. |
| ***recoverySearchSpaceId***  Search space to use for BFR RAR. The network configures this search space to be within the linked DL BWP (i.e., within the DL BWP with the same *bwp-Id*) of the UL BWP in which the *BeamFailureRecoveryConfig* is provided. The CORESET associated with the recovery search space cannot be associated with another search space. Network always configures the UE with a value for this field when contention free random access resources for BFR are configured. |
| ***rootSequenceIndex-BFR***  PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1) for beam failure recovery. |
| ***spCell-BFR-CBRA***  Indicates that UE is configured to send BFR MAC CE for SpCell BFR as specified in TS38.321 [3]. |
| ***ssb-perRACH-Occasion***  Number of SSBs per RACH occasion for CF-BFR, see TS 38.213 [13], clause 8.1. |

|  |
| --- |
| ***BFR-CSIRS-Resource* field descriptions** |
| ***csi-RS***  The ID of a *NZP-CSI-RS-Resource* configured in the *CSI-MeasConfig* of this serving cell. This reference signal determines a candidate beam for beam failure recovery (BFR). |
| ***ra-OccasionList***  RA occasions that the UE shall use when performing BFR upon selecting the candidate beam identified by this CSI-RS. The network ensures that the RA occasion indexes provided herein are also configured by *prach-ConfigurationIndex* and *msg1-FDM*. Each RACH occasion is sequentially numbered, first, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions; second, in increasing order of time resource indexes for time multiplexed PRACH occasions within a PRACH slot and Third, in increasing order of indexes for PRACH slots.  If the field is absent the UE uses the RA occasion associated with the SSB that is QCLed with this CSI-RS. |
| ***ra-PreambleIndex***  The RA preamble index to use in the RA occasions associated with this CSI-RS. If the field is absent, the UE uses the preamble index associated with the SSB that is QCLed with this CSI-RS. |

|  |
| --- |
| ***BFR-SSB-Resource* field descriptions** |
| ***ra-PreambleIndex***  The preamble index that the UE shall use when performing BFR upon selecting the candidate beams identified by this SSB. |
| ***ssb***  The ID of an SSB transmitted by this serving cell. It determines a candidate beam for beam failure recovery (BFR). |

< Unmodified parts omitted >

– *BWP*

The IE *BWP* is used to configure generic parameters of a bandwidth part as defined in TS 38.211 [16], clause 4.5, and TS 38.213 [13], clause 12.

For each serving cell the network configures at least an initial downlink bandwidth part and one (if the serving cell is configured with an uplink) or two (if using supplementary uplink (SUL)) initial uplink bandwidth parts. Furthermore, the network may configure additional uplink and downlink bandwidth parts for a serving cell.

The uplink and downlink bandwidth part configurations are divided into common and dedicated parameters.

***BWP* information element**

-- ASN1START

-- TAG-BWP-START

BWP ::= SEQUENCE {

locationAndBandwidth INTEGER (0..37949),

subcarrierSpacing SubcarrierSpacing,

cyclicPrefix ENUMERATED { extended } OPTIONAL -- Need R

}

-- TAG-BWP-STOP

-- ASN1STOP

|  |
| --- |
| ***BWP* field descriptions** |
| ***cyclicPrefix***  Indicates whether to use the extended cyclic prefix for this bandwidth part. If not set, the UE uses the normal cyclic prefix. Normal CP is supported for all subcarrier spacings and slot formats. Extended CP is supported only for 60 kHz subcarrier spacing. (see TS 38.211 [16], clause 4.2). Except for SUL, the network ensures the same cyclic prefix length is used in active DL BWP and active UL BWP within a serving cell. |
| ***locationAndBandwidth***  Frequency domain location and bandwidth of this bandwidth part. The value of the field shall be interpreted as resource indicator value (RIV) as defined TS 38.214 [19] with assumptions as described in TS 38.213 [13], clause 12, i.e. setting =275. The first PRB is a PRB determined by *subcarrierSpacing* of this BWP and *offsetToCarrier* (configured in *SCS-SpecificCarrier* contained within *FrequencyInfoDL* / *FrequencyInfoUL* / *FrequencyInfoUL-SIB* / *FrequencyInfoDL-SIB* within *ServingCellConfigCommon* / *ServingCellConfigCommonSIB*) corresponding to this subcarrier spacing. In case of TDD, a BWP-pair (UL BWP and DL BWP with the same *bwp-Id*) must have the same center frequency (see TS 38.213 [13], clause 12) |
| ***subcarrierSpacing***  Subcarrier spacing to be used in this BWP for all channels and reference signals unless explicitly configured elsewhere. Corresponds to subcarrier spacing according to TS 38.211 [16], table 4.2-1. The value *kHz15* corresponds to µ=0, value *kHz30* corresponds to µ=1, and so on.  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  For the initial DL BWP and operation in licensed spectrum this field has the same value as the field *subCarrierSpacingCommon* in *MIB* of the same serving cell. Except for SUL, the network ensures the same subcarrier spacing is used in active DL BWP and active UL BWP within a serving cell. For the initial DL BWP and operation with shared spectrum channel access, the value of this field corresponds to the subcarrier spacing of the SSB associated to the initial DL BWP. |

< Unmodified parts omitted >

– *ConfiguredGrantConfig*

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

***ConfiguredGrantConfig* information element**

-- ASN1START

-- TAG-CONFIGUREDGRANTCONFIG-START

ConfiguredGrantConfig ::= SEQUENCE {

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

cg-DMRS-Configuration DMRS-UplinkConfig,

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

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

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

resourceAllocation ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch },

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

powerControlLoopToUse ENUMERATED {n0, n1},

p0-PUSCH-Alpha P0-PUSCH-AlphaSetId,

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

nrofHARQ-Processes INTEGER(1..16),

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

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

periodicity ENUMERATED {

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

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

sym640x14, sym1024x14, sym1280x14, sym2560x14, sym5120x14,

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

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

sym1280x12, sym2560x12

},

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

rrc-ConfiguredUplinkGrant SEQUENCE {

timeDomainOffset INTEGER (0..5119),

timeDomainAllocation INTEGER (0..15),

frequencyDomainAllocation BIT STRING (SIZE(18)),

antennaPort INTEGER (0..31),

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

precodingAndNumberOfLayers INTEGER (0..63),

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

mcsAndTBS INTEGER (0..31),

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

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

...,

[[

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

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

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

]],

[[

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

]]

} OPTIONAL, -- Need R

...,

[[

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

cg-minDFI-Delay-r16 ENUMERATED

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

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

} OPTIONAL, -- Need R

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

]],

[[

cg-COT-SharingList-r17 SEQUENCE (SIZE (1..1709)) OF CG-COT-Sharing-r17 OPTIONAL, -- Need R

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

]]

}

CG-UCI-OnPUSCH ::= CHOICE {

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

semiStatic BetaOffsets

}

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

noCOT-Sharing-r16 NULL,

cot-Sharing-r16 SEQUENCE {

duration-r16 INTEGER (1..39),

offset-r16 INTEGER (1..39),

channelAccessPriority-r16 INTEGER (1..4)

}

}

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

noCOT-Sharing-r17 NULL,

cot-Sharing-r17 SEQUENCE {

duration-r17 INTEGER (1..139),

offset-r17 INTEGER (1..139)

}

}

CG-StartingOffsets-r16 ::= SEQUENCE {

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

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

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

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

}

-- TAG-CONFIGUREDGRANTCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***ConfiguredGrantConfig* field descriptions** |
| ***antennaPort***  Indicates the antenna port(s) to be used for this configuration, and the maximum bitwidth is 5. See TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1. |
| ***autonomousTx***  If this field is present, the Configured Grant configuration is configured with autonomous transmission, see TS 38.321 [3]. |
| ***betaOffsetCG-UCI***  Beta offset for CG-UCI in CG-PUSCH, see TS 38.213 [13], clause 9.3 |
| ***cg-COT-SharingList***  Indicates a table for COT sharing combinations (see 37.213 [48], clause 4.1.3). One row of the table can be set to noCOT-Sharing to indicate that there is no channel occupancy sharing. The field *cg-COT-SharingList-r17* is only applicable for FR2-2. |
| ***cg-COT-SharingOffset***  Indicates the offset from the end of the slot where the COT sharing indication in UCI is enabled where the offset in symbols is equal to 14\*n, where n is the signaled value for *cg-COT-SharingOffset*. Applicable when *ul-toDL-COT-SharingED-Threshold-r16* is not configured (see 37.213 [48], clause 4.1.3). |
| ***cg-DMRS-Configuration***  DMRS configuration (see TS 38.214 [19], clause 6.1.2.3). |
| ***cg-minDFI-Delay***  Indicates the minimum duration (in unit of symbols) from the ending symbol of the PUSCH to the starting symbol of the PDCCH containing the downlink feedback indication (DFI) carrying HARQ-ACK for this PUSCH. The HARQ-ACK received before this minimum duration is not considered as valid for this PUSCH (see TS 38.213 [13], clause 10.5). The following minimum duration values are supported, depending on the configured subcarrier spacing [symbols]:  15 kHz: 7, m\*14, where m = {1, 2, 3, 4}  30 kHz: 7, m\*14, where m = {1, 2, 3, 4, 5, 6, 7, 8}  60 kHz: 7, m\*14, where m = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16} |
| ***cg-nrofPUSCH-InSlot***  Indicates the number of consecutive PUSCH configured to CG within a slot where the SLIV indicating the first PUSCH and additional PUSCH appended with the same length (see TS 38.214 [19], clause 6.1.2.3). |
| ***cg-nrofSlots***  Indicates the number of allocated slots in a configured grant periodicity following the time instance of configured grant offset (see TS 38.214 [19], clause 6.1.2.3). |
| ***cg-RetransmissionTimer***  Indicates the initial value of the configured retransmission timer (see TS 38.321 [3]) in multiples of *periodicity*. The value of *cg-RetransmissionTimer* is always less than or equal to the value of *configuredGrantTimer.* This field is always configured for operation with shared spectrum channel access together with *harq-ProcID-Offset*.. This field is not configured for operation in licensed spectrum or simultaneously with *harq-ProcID-Offset2.* |
| ***cg-UCI-Multiplexing***  If present, this field indicates that in the case of PUCCH overlapping with CG-PUSCH(s) within a PUCCH group, the CG-UCI and HARQ-ACK are jointly encoded (see TS 38.213 [13], clause 9). |
| ***configuredGrantConfigIndex***  Indicates the index of the Configured Grant configurations within the BWP. |
| ***configuredGrantConfigIndexMAC***  Indicates the index of the Configured Grant configurations within the MAC entity. |
| ***configuredGrantTimer***  Indicates the initial value of the configured grant timer (see TS 38.321 [3]) in multiples of periodicity. When *cg-RetransmissonTimer* is configured, if HARQ processes are shared among different configured grants on the same BWP, *configuredGrantTimer \* periodicity* is set to the same value for the configurations that share HARQ processes on this BWP. |
| ***dmrs-SeqInitialization***  The network configures this field if *transformPrecoder* is disabled. Otherwise the field is absent. |
| ***frequencyDomainAllocation***  Indicates the frequency domain resource allocation, see TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1). |
| ***frequencyHopping***  The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured. The field *frequencyHopping* applies to configured grant for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3.1). |
| ***frequencyHoppingOffset***  Frequency hopping offset used when frequency hopping is enabled (see TS 38.214 [19], clause 6.1.2 and clause 6.3). |
| ***frequencyHoppingPUSCH-RepTypeB***  Indicates the frequency hopping scheme for Type 1 CG when *pusch-RepTypeIndicator* is set to 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1). The value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, the frequency hopping is not enabled for Type 1 CG. |
| ***harq-ProcID-Offset***  For operation with shared spectrum channel access, this configures the range of HARQ process IDs which can be used for this configured grant where the UE can select a HARQ process ID within [*harq-procID-offset, ..,* (*harq-procID-offset + nrofHARQ-Processes* – 1)]. |
| ***harq-ProcID-Offset2***  Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.4.1. This field is not configured for operation with shared spectrum channel access. |
| ***mcs-Table***  Indicates the MCS table the UE shall use for PUSCH without transform precoding. If the field is absent the UE applies the value *qam64*. |
| ***mcs-TableTransformPrecoder***  Indicates the MCS table the UE shall use for PUSCH with transform precoding. If the field is absent the UE applies the value *qam64*. |
| ***mcsAndTBS***  The modulation order, target code rate and TB size (see TS 38.214 [19], clause 6.1.2). The NW does not configure the values 28~31 in this version of the specification. |
| ***nrofHARQ-Processes***  The number of HARQ processes configured. It applies for both Type 1 and Type 2. See TS 38.321 [3], clause 5.4.1. |
| ***p0-PUSCH-Alpha***  Index of the *P0-PUSCH-AlphaSet* to be used for this configuration. |
| ***periodicity***  Periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5.8.2).  The following periodicities are supported depending on the configured subcarrier spacing [symbols]:  15 kHz: 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 320, 640}  30 kHz: 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 640, 1280}  60 kHz with normal CP 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560}  60 kHz with ECP: 2, 6, n\*12, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560}  120 kHz: 2, 7, n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120}  480 and 960 kHz: n\*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120} |
| ***periodicityExt***  This field is used to calculate the *periodicity* for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5,8.2). If this field is present, the field *periodicity* is ignored.  The following periodicites are supported depending on the configured subcarrier spacing [symbols]:  15 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 640.  30 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 1280.  60 kHz with normal CP: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 2560.  60 kHz with ECP: *periodicityExt*\*12, where *periodicityExt* has a value between 1 and 2560.  120 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 5120.  480 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 20480.  960 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 40960. |
| ***phy-PriorityIndex***  Indicates the PHY priority of CG PUSCH at least for PHY-layer collision handling. Value *p0* indicates low priority and value *p1* indicates high priority. |
| ***powerControlLoopToUse***  Closed control loop to apply (see TS 38.213 [13], clause 7.1.1). |
| ***pusch-RepTypeIndicator***  Indicates whether UE follows the behavior for PUSCH repetition type A or the behavior for PUSCH repetition type B for each Type 1 configured grant configuration. The value *pusch-RepTypeA* enables the 'PUSCH repetition type A' and the value *pusch-RepTypeB* enables the 'PUSCH repetition type B' (see TS 38.214 [19], clause 6.1.2.3). The value *pusch-RepTypeB* is not configured simultaneously with *cg-nrofPUSCH-InSlot-r16* and *cg-nrofSlots-r16*. |
| ***rbg-Size***  Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent. Note: *rbg-Size* is used when the *transformPrecoder* parameter is disabled. |
| ***repK-RV***  The redundancy version (RV) sequence to use. See TS 38.214 [19], clause 6.1.2. The network configures this field if repetitions are used, i.e., if *repK* is set to *n2*, *n4* or *n8*. This field is not configured when *cg-RetransmissionTimer* is configured. Otherwise, the field is absent. |
| ***repK***  Number of repetitions K, see TS 38.214 [19]. |
| ***resourceAllocation***  Configuration of resource allocation type 0 and resource allocation type 1. For Type 1 UL data transmission without grant, *resourceAllocation* should be *resourceAllocationType0* or *resourceAllocationType1*. |
| ***rrc-ConfiguredUplinkGrant***  Configuration for "configured grant" transmission with fully RRC-configured UL grant (Type1). If this field is absent the UE uses UL grant configured by DCI addressed to CS-RNTI (Type2). |
| ***srs-ResourceIndicator***  Indicates the SRS resource to be used. |
| ***startingFromRV0***  This field is used to determine the initial transmission occasion of a transport block for a given RV sequence, see TS 38.214 [19], clause 6.1.2.3.1. |
| ***timeDomainAllocation***  Indicates a combination of start symbol and length and PUSCH mapping type, see TS 38.214 [19], clause 6.1.2 and TS 38.212 [17], clause 7.3.1. |
| ***timeDomainOffset***  Offset related to the reference SFN indicated by *timeReferenceSFN*, see TS 38.321 [3], clause 5.8.2. *timeDomainOffset-r17* is only applicable to 480 kHz and 960 kHz. If *timeDomainOffset-r17* is present, the UE shall ignore *timeDomainOffset* (without suffix). |
| ***timeReferenceSFN***  Indicates SFN used for determination of the offset of a resource in time domain. The UE uses the closest SFN with the indicated number preceding the reception of the configured grant configuration, see TS 38.321 [3], clause 5.8.2. If the field *timeReferenceSFN* is not present, the reference SFN is 0. |
| ***transformPrecoder***  Enables or disables transform precoding for *type1* and *type2*. If the field is absent, the UE enables or disables transform precoding in accordance with the field *msg3-transformPrecoder* in *RACH-ConfigCommon*, see TS 38.214 [19], clause 6.1.3. |
| ***uci-OnPUSCH***  Selection between and configuration of dynamic and semi-static beta-offset. For Type 1 UL data transmission without grant, *uci-OnPUSCH* should be set to *semiStatic.* |

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

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

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *LCH-BasedPrioritization* | This fiels is optionally present, Need R, if *lch-BasedPrioritization* is configured in the MAC entity. It is absent otherwise. |
| *RepTypeB* | The field is optionally present if pusch-RepTypeIndicator is set to pusch-RepTypeB, Need S, and absent otherwise. |
| *CG-List* | The field is mandatory present when included in *configuredGrantConfigToAddModList-r16*, otherwise the field is absent. |
| *CG-IndexMAC* | The field is mandatory present if at least one configured grant is configured by *configuredGrantConfigToAddModList-r16* in any BWP of this MAC entity, otherwise it is optionally present, need R. |

< Unmodified parts omitted >

– *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),

...

}

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. |

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| ***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: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |

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| --- |
| ***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. Value 2 is supported only when *dmrs-TypeA-Position* equals *pos3*. |
| ***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 *subcarrierSpacingCSI-RS* is set to *kHz15*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 3/4/9/19/39 slots. When *subcarrierSpacingCSI-RS* is set to *kHz30*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 7/9/19/39/79 slots. When *subcarrierSpacingCSI-RS* is set to *kHz60*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 15/19/39/79/159 slots. When *subcarrierSpacingCSI-RS* is set *kHz120*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 31/39/79/159/319 slots. |

< Unmodified parts omitted >

– *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-v17xy ::= SEQUENCE {

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

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

}

-- 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). |
| ***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). |
| ***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-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*. A value of 1 corresponds to *drx-ShortCycle*, a value of 2 corresponds to 2 \* *drx-ShortCycle* 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. |

< Unmodified parts omitted >

– *LogicalChannelConfig*

The IE *LogicalChannelConfig* is used to configure the logical channel parameters.

-- ASN1START

-- TAG-LOGICALCHANNELCONFIG-START

LogicalChannelConfig ::= SEQUENCE {

ul-SpecificParameters SEQUENCE {

priority INTEGER (1..16),

prioritisedBitRate ENUMERATED {kBps0, kBps8, kBps16, kBps32, kBps64, kBps128, kBps256, kBps512,

kBps1024, kBps2048, kBps4096, kBps8192, kBps16384, kBps32768, kBps65536, infinity},

bucketSizeDuration ENUMERATED {ms5, ms10, ms20, ms50, ms100, ms150, ms300, ms500, ms1000,

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

allowedServingCells SEQUENCE (SIZE (1..maxNrofServingCells-1)) OF ServCellIndex

OPTIONAL, -- Cond PDCP-CADuplication

allowedSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SubcarrierSpacing OPTIONAL, -- Need R

maxPUSCH-Duration ENUMERATED {ms0p02, ms0p04, ms0p0625, ms0p125, ms0p25, ms0p5, ms0p01-v17xy, spare1}

OPTIONAL, -- Need R

configuredGrantType1Allowed ENUMERATED {true} OPTIONAL, -- Need R

logicalChannelGroup INTEGER (0..maxLCG-ID) OPTIONAL, -- Need R

schedulingRequestID SchedulingRequestId OPTIONAL, -- Need R

logicalChannelSR-Mask BOOLEAN,

logicalChannelSR-DelayTimerApplied BOOLEAN,

...,

bitRateQueryProhibitTimer ENUMERATED {s0, s0dot4, s0dot8, s1dot6, s3, s6, s12, s30} OPTIONAL, -- Need R

[[

allowedCG-List-r16 SEQUENCE (SIZE (0.. maxNrofConfiguredGrantConfigMAC-1-r16)) OF ConfiguredGrantConfigIndexMAC-r16

OPTIONAL, -- Need S

allowedPHY-PriorityIndex-r16 ENUMERATED {p0, p1} OPTIONAL -- Need S

]]

} OPTIONAL, -- Cond UL

...,

[[

channelAccessPriority-r16 INTEGER (1..4) OPTIONAL, -- Need R

bitRateMultiplier-r16 ENUMERATED {x40, x70, x100, x200} OPTIONAL -- Need R

]]

}

-- TAG-LOGICALCHANNELCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***LogicalChannelConfig* field descriptions** |
| ***allowedCG-List***  This restriction applies only when the UL grant is a configured grant. If present, UL MAC SDUs from this logical channel can only be mapped to the indicated configured grant configuration. If the size of the sequence is zero, then UL MAC SDUs from this logical channel cannot be mapped to any configured grant configurations. If the field is not present, UL MAC SDUs from this logical channel can be mapped to any configured grant configurations. If the field configuredGrantType1Allowed is present, only those configured grant type 1 configuration indicated in this sequence are allowed for use by this logical channel; otherwise, this sequence shall not include any configured grant type 1 configuration. Corresponds to "allowedCG-List" as specified in TS 38.321 [3]. |
| ***allowedPHY-PriorityIndex***  This restriction applies only when the UL grant is a dynamic grant. If the field is present and the dynamic grant has a PHY-priority index, UL MAC SDUs from this logical channel can only be mapped to the dynamic grants indicating PHY-priority index equal to the values configured by this field. If the field is present and the dynamic grant does not have a PHY-priority index, UL MAC SDUs from this logical channel can only be mapped to this dynamic grant if the value of the field is *p0*, see TS 38.213 [13], clause 9. If the field is not present, UL MAC SDUs from this logical channel can be mapped to any dynamic grants. Corresponds to "allowedPHY-PriorityIndex" as specified in TS 38.321 [3]. |
| ***allowedSCS-List***  If present, UL MAC SDUs from this logical channel can only be mapped to the indicated numerology. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured numerology. Corresponds to *'allowedSCS-List'* as specified in TS 38.321 [3].  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 |
| ***allowedServingCells***  If present, UL MAC SDUs from this logical channel can only be mapped to the serving cells indicated in this list. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured serving cell of this cell group. Corresponds to 'allowedServingCells' in TS 38.321 [3]. |
| ***bitRateMultiplier***  Bit rate multiplier for recommended bit rate MAC CE as specified in TS 38.321 [3]. Value *x40* indicates bit rate multiplier 40, value *x70* indicates bit rate multiplier 70 and so on. |
| ***bitRateQueryProhibitTimer***  The timer is used for bit rate recommendation query in TS 38.321 [3], in seconds. Value *s0* means 0 s, *s0dot4* means 0.4 s and so on. |
| ***bucketSizeDuration***  Value in ms. *ms5* corresponds to 5 ms, value *ms10* corresponds to 10 ms, and so on. |
| ***channelAccessPriority***  Indicates the Channel Access Priority Class (CAPC), as specified in TS 38.300 [2], to be used on uplink transmissions for operation with shared spectrum channel access. The network configures this field only for SRB2 and DRBs. |
| ***configuredGrantType1Allowed***  If present, or if the capability *lcp-Restriction* as specified in TS 38.306 [26] is not supported, UL MAC SDUs from this logical channel can be transmitted on a configured grant type 1. Otherwise, UL MAC SDUs from this logical channel cannot be transmitted on a configured grant type 1. Corresponds to 'configuredGrantType1Allowed' in TS 38.321 [3]. |
| ***logicalChannelGroup***  ID of the logical channel group, as specified in TS 38.321 [3], which the logical channel belongs to. |
| ***logicalChannelSR-Mask***  Controls SR triggering when a configured uplink grant of *type1* or *type2* is configured. *true* indicates that SR masking is configured for this logical channel as specified in TS 38.321 [3]. |
| ***logicalChannelSR-DelayTimerApplied***  Indicates whether to apply the delay timer for SR transmission for this logical channel. Set to *false* if *logicalChannelSR-DelayTimer* is not included in *BSR-Config*. |
| ***maxPUSCH-Duration***  If present, UL MAC SDUs from this logical channel can only be transmitted using uplink grants that result in a PUSCH duration shorter than or equal to the duration indicated by this field. Otherwise, UL MAC SDUs from this logical channel can be transmitted using an uplink grant resulting in any PUSCH duration. Corresponds to "maxPUSCH-Duration" in TS 38.321 [3]. The PUSCH duration is calculated based on the same length of all symbols, and the shortest length applies if the symbol lengths are different. |
| ***priority***  Logical channel priority, as specified in TS 38.321 [3]. |
| ***prioritisedBitRate***  Value in kiloBytes/s. Value *kBps0* corresponds to 0 kiloBytes/s, value *kBps8* corresponds to 8 kiloBytes/s, value *kBps16* corresponds to 16 kiloBytes/s, and so on. For SRBs, the value can only be set to *infinity*. |
| ***schedulingRequestId***  If present, it indicates the scheduling request configuration applicable for this logical channel, as specified in TS 38.321 [3]. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *PDCP-CADuplication* | The field is mandatory present if the DRB/SRB associated with this logical channel is configured with PDCP CA duplication in UL in the cell group in which this IE is included (i.e. the PDCP entity is associated with multiple RLC entities belonging to this cell group). Otherwise the field is optionally present, need R. |
| *UL* | The field is mandatory present for a logical channel with uplink if it serves DRB. It is optionally present, Need R, for a logical channel with uplink if it serves an SRB. Otherwise it is absent. |

< Unmodified parts omitted >

– *MAC-CellGroupConfig*

The IE *MAC-CellGroupConfig* is used to configure MAC parameters for a cell group, including DRX.

***MAC-CellGroupConfig* information element**

-- ASN1START

-- TAG-MAC-CELLGROUPCONFIG-START

MAC-CellGroupConfig ::= SEQUENCE {

drx-Config SetupRelease { DRX-Config } OPTIONAL, -- Need M

schedulingRequestConfig SchedulingRequestConfig OPTIONAL, -- Need M

bsr-Config BSR-Config OPTIONAL, -- Need M

tag-Config TAG-Config OPTIONAL, -- Need M

phr-Config SetupRelease { PHR-Config } OPTIONAL, -- Need M

skipUplinkTxDynamic BOOLEAN,

...,

[[

csi-Mask BOOLEAN OPTIONAL, -- Need M

dataInactivityTimer SetupRelease { DataInactivityTimer } OPTIONAL -- Cond MCG-Only

]],

[[

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

schedulingRequestID-LBT-SCell-r16 SchedulingRequestId OPTIONAL, -- Need R

lch-BasedPrioritization-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

schedulingRequestID-BFR-SCell-r16 SchedulingRequestId OPTIONAL, -- Need R

drx-ConfigSecondaryGroup-r16 SetupRelease { DRX-ConfigSecondaryGroup } OPTIONAL -- Need M

]],

[[

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

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

]],

[[

drx-ConfigExt-v17xy SetupRelease { DRX-ConfigExt-v17xy } OPTIONAL -- Cond DRX

]]

}

DataInactivityTimer ::= ENUMERATED {s1, s2, s3, s5, s7, s10, s15, s20, s40, s50, s60, s80, s100, s120, s150, s180}

-- TAG-MAC-CELLGROUPCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***MAC-CellGroupConfig* field descriptions** |
| ***usePreBSR***  If set to true, the MAC entity of the IAB-MT may use the Pre-emptive BSR, see TS 38.321 [3]. |
| ***csi-Mask***  If set to true, the UE limits CSI reports to the on-duration period of the DRX cycle, see TS 38.321 [3]. |
| ***dataInactivityTimer***  Releases the RRC connection upon data inactivity as specified in clause 5.3.8.5 and in TS 38.321 [3]. Value *s1* corresponds to 1 second, value s2 corresponds to 2 seconds, and so on. |
| ***drx-Config, drx-ConfigExt***  Used to configure DRX as specified in TS 38.321 [3]. |
| ***drx-ConfigSecondaryGroup***  Used to configure DRX related parameters for the second DRX group as specified in TS 38.321 [3]. The network does not configure secondary DRX group with DCP simultaneously nor secondary DRX group with a dormant BWP simultaneously. |
| ***lch-BasedPrioritization***  If this field is present, the corresponding MAC entity of the UE is configured with prioritization between overlapping grants and between scheduling request and overlapping grants based on LCH priority, see TS 38.321 [3]. |
| ***schedulingRequestID-BFR-SCell***  Indicates the scheduling request configuration applicable for BFR on SCell, as specified in TS 38.321 [3]. |
| ***schedulingRequestID-LBT-SCell***  Indicates the scheduling request configuration applicable for consistent uplink LBT recovery on SCell, as specified in TS 38.321 [3]. |
| ***skipUplinkTxDynamic, enhancedSkipUplinkTxDynamic, enhancedSkipUplinkTxConfigured***  If set to *true*, the UE skips UL transmissions as described in TS 38.321 [3]. If the UE is configured with *enhancedSkipUplinkTxDynamic* or *enhancedSkipUplinkTxConfigured* with value *true*, REPETITION\_NUMBER (as specified in TS 38.321 [3], clause 5.4.2.1) of the corresponding PUSCH transmission of the uplink grant shall be equal to 1. |
| ***tag-Config***  The field is used to configure parameters for a time-alignment group. The field is not present if any DAPS bearer is configured. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *DRX* | This field is optionally present, Need M, if *drx-Config* is included and set to ‘setup’. It is absent otherwise. |
| *MCG-Only* | This field is optionally present, Need M, for the *MAC-CellGroupConfig* of the MCG. It is absent otherwise. |

< Unmodified parts omitted >

– *MeasIdleConfig*

The IE *MeasIdleConfig* is used to convey information to UE about measurements requested to be done while in RRC\_IDLE or RRC\_INACTIVE.

***MeasIdleConfig* information element**

-- ASN1START

-- TAG-MEASIDLECONFIG-START

MeasIdleConfigSIB-r16 ::= SEQUENCE {

measIdleCarrierListNR-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16 OPTIONAL, -- Need S

measIdleCarrierListEUTRA-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16 OPTIONAL, -- Need S

...

}

MeasIdleConfigDedicated-r16 ::= SEQUENCE {

measIdleCarrierListNR-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16 OPTIONAL, -- Need N

measIdleCarrierListEUTRA-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16 OPTIONAL, -- Need N

measIdleDuration-r16 ENUMERATED{sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare},

validityAreaList-r16 ValidityAreaList-r16 OPTIONAL, -- Need N

...

}

ValidityAreaList-r16 ::= SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF ValidityArea-r16

ValidityArea-r16 ::= SEQUENCE {

carrierFreq-r16 ARFCN-ValueNR,

validityCellList-r16 ValidityCellList OPTIONAL -- Need N

}

ValidityCellList ::= SEQUENCE (SIZE (1.. maxCellMeasIdle-r16)) OF PCI-Range

MeasIdleCarrierNR-r16 ::= SEQUENCE {

carrierFreq-r16 ARFCN-ValueNR,

ssbSubcarrierSpacing-r16 SubcarrierSpacing,

frequencyBandList MultiFrequencyBandListNR OPTIONAL, -- Need R

measCellListNR-r16 CellListNR-r16 OPTIONAL, -- Need R

reportQuantities-r16 ENUMERATED {rsrp, rsrq, both},

qualityThreshold-r16 SEQUENCE {

idleRSRP-Threshold-NR-r16 RSRP-Range OPTIONAL, -- Need R

idleRSRQ-Threshold-NR-r16 RSRQ-Range OPTIONAL -- Need R

} OPTIONAL, -- Need R

ssb-MeasConfig-r16 SEQUENCE {

nrofSS-BlocksToAverage-r16 INTEGER (2..maxNrofSS-BlocksToAverage) OPTIONAL, -- Need S

absThreshSS-BlocksConsolidation-r16 ThresholdNR OPTIONAL, -- Need S

smtc-r16 SSB-MTC OPTIONAL, -- Need S

ssb-ToMeasure-r16 SSB-ToMeasure OPTIONAL, -- Need S

deriveSSB-IndexFromCell-r16 BOOLEAN,

ss-RSSI-Measurement-r16 SS-RSSI-Measurement OPTIONAL -- Need S

} OPTIONAL, -- Need S

beamMeasConfigIdle-r16 BeamMeasConfigIdle-NR-r16 OPTIONAL, -- Need R

...

}

MeasIdleCarrierEUTRA-r16 ::= SEQUENCE {

carrierFreqEUTRA-r16 ARFCN-ValueEUTRA,

allowedMeasBandwidth-r16 EUTRA-AllowedMeasBandwidth,

measCellListEUTRA-r16 CellListEUTRA-r16 OPTIONAL, -- Need R

reportQuantitiesEUTRA-r16 ENUMERATED {rsrp, rsrq, both},

qualityThresholdEUTRA-r16 SEQUENCE {

idleRSRP-Threshold-EUTRA-r16 RSRP-RangeEUTRA OPTIONAL, -- Need R

idleRSRQ-Threshold-EUTRA-r16 RSRQ-RangeEUTRA-r16 OPTIONAL -- Need R

} OPTIONAL, -- Need S

...

}

CellListNR-r16 ::= SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF PCI-Range

CellListEUTRA-r16 ::= SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF EUTRA-PhysCellIdRange

BeamMeasConfigIdle-NR-r16 ::= SEQUENCE {

reportQuantityRS-Indexes-r16 ENUMERATED {rsrp, rsrq, both},

maxNrofRS-IndexesToReport-r16 INTEGER (1.. maxNrofIndexesToReport),

includeBeamMeasurements-r16 BOOLEAN

}

RSRQ-RangeEUTRA-r16 ::= INTEGER (-30..46)

-- TAG-MEASIDLECONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***MeasIdleConfig* field descriptions** |
| ***absThreshSS-BlocksConsolidation***  Threshold for consolidation of L1 measurements per RS index. |
| ***beamMeasConfigIdle***  Indicates the beam level measurement configuration. |
| ***carrierFreq***  Indicates the NR carrier frequency to be used for measurements during RRC\_IDLE or RRC\_INACTIVE. |
| ***carrierFreqEUTRA***  Indicates the E-UTRA carrier frequency to be used for measurements during RRC\_IDLE or RRC\_INACTIVE. |
| ***deriveSSB-IndexFromCell***  This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to true, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14]. |
| ***frequencyBandList***  Indicates the list of frequency bands for which the NR idle/inactive measurement parameters apply. The UE shall select the first listed band which it supports in the frequencyBandList field to represent the NR neighbour carrier frequency. |
| ***includeBeamMeasurements***  Indicates whether or not the UE shall include beam measurements in the NR idle/inactive measurement results. |
| ***maxNrofRS-IndexesToReport***  Max number of beam indices to include in the idle/inactive measurement result. |
| ***measCellListEUTRA***  Indicates the list of E-UTRA cells which the UE is requested to measure and report for idle/inactive measurements. |
| ***measCellListNR***  Indicates the list of NR cells which the UE is requested to measure and report for idle/inactive measurements. |
| ***measIdleCarrierListEUTRA***  Indicates the E-UTRA carriers to be measured during RRC\_IDLE or RRC\_INACTIVE. |
| ***measIdleCarrierListNR***  Indicates the NR carriers to be measured during RRC\_IDLE or RRC\_INACTIVE. |
| ***measIdleDuration***  Indicates the duration for performing idle/inactive measurements while in RRC\_IDLE or RRC\_INACTIVE. Value sec10 correspond to 10 seconds, value sec30 to 30 seconds and so on. |
| ***nrofSS-BlocksToAverage***  Number of SS blocks to average for cell measurement derivation. |
| ***qualityThreshold***  Indicates the quality thresholds for reporting the measured cells for idle/inactive NR measurements. |
| ***qualityThresholdEUTRA***  Indicates the quality thresholds for reporting the measured cells for idle/inactive E-UTRA measurements. |
| ***reportQuantities***  Indicates which measurement quantities UE is requested to report in the idle/inactive measurement report. |
| ***reportQuantitiesEUTRA***  Indicates which E-UTRA measurement quantities the UE is requested to report in the idle/inactive measurement report. |
| ***reportQuantityRS-Indexes***  Indicates which measurement information per beam index the UE shall include in the NR idle/inactive measurement results. |
| ***smtc***  Indicates the measurement timing configuration for inter-frequency measurement. If this field is absent in *VarMeasIdleConfig*, the UE assumes that SSB periodicity is 5 ms in this frequency. |
| ***ssbSubcarrierSpacing***  Indicates subcarrier spacing of SSB.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |
| ***ssb-ToMeasure***  The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent in *VarMeasIdleConfig*, the UE measures on all SS-blocks. |
| ***ss-RSSI-Measurement***  Indicates the SSB-based RSSI measurement configuration. If the field is absent in *VarMeasIdleConfig*, the UE behaviour is defined in TS 38.215 [89], clause 5.1.3. |
| ***validityAreaList***  Indicates the list of frequencies and optionally, for each frequency, a list of cells within which the UE is required to perform measurements while in RRC\_IDLE and RRC\_INACTIVE. |

< Unmodified parts omitted >

*– MeasObjectCLI*

The IE *MeasObjectCLI* specifies information applicable for SRS-RSRP measurements and/or CLI-RSSI measurements.

***MeasObjectCLI* information element**

-- ASN1START

-- TAG-MEASOBJECTCLI-START

MeasObjectCLI-r16 ::= SEQUENCE {

cli-ResourceConfig-r16 CLI-ResourceConfig-r16,

...

}

CLI-ResourceConfig-r16 ::= SEQUENCE {

srs-ResourceConfig-r16 SetupRelease { SRS-ResourceListConfigCLI-r16 } OPTIONAL, -- Need M

rssi-ResourceConfig-r16 SetupRelease { RSSI-ResourceListConfigCLI-r16 } OPTIONAL -- Need M

}

SRS-ResourceListConfigCLI-r16 ::= SEQUENCE (SIZE (1.. maxNrofCLI-SRS-Resources-r16)) OF SRS-ResourceConfigCLI-r16

RSSI-ResourceListConfigCLI-r16 ::= SEQUENCE (SIZE (1.. maxNrofCLI-RSSI-Resources-r16)) OF RSSI-ResourceConfigCLI-r16

SRS-ResourceConfigCLI-r16 ::= SEQUENCE {

srs-Resource-r16 SRS-Resource,

srs-SCS-r16 SubcarrierSpacing,

refServCellIndex-r16 ServCellIndex OPTIONAL, -- Need S

refBWP-r16 BWP-Id,

...

}

RSSI-ResourceConfigCLI-r16 ::= SEQUENCE {

rssi-ResourceId-r16 RSSI-ResourceId-r16,

rssi-SCS-r16 SubcarrierSpacing,

startPRB-r16 INTEGER (0..2169),

nrofPRBs-r16 INTEGER (4..maxNrofPhysicalResourceBlocksPlus1),

startPosition-r16 INTEGER (0..13),

nrofSymbols-r16 INTEGER (1..14),

rssi-PeriodicityAndOffset-r16 RSSI-PeriodicityAndOffset-r16,

refServCellIndex-r16 ServCellIndex OPTIONAL, -- Need S

...

}

RSSI-ResourceId-r16 ::= INTEGER (0.. maxNrofCLI-RSSI-Resources-1-r16)

RSSI-PeriodicityAndOffset-r16 ::= CHOICE {

sl10 INTEGER(0..9),

sl20 INTEGER(0..19),

sl40 INTEGER(0..39),

sl80 INTEGER(0..79),

sl160 INTEGER(0..159),

sl320 INTEGER(0..319),

s1640 INTEGER(0..639),

...

}

-- TAG-MEASOBJECTCLI-STOP

-- ASN1STOP

|  |
| --- |
| ***CLI-ResourceConfig* field descriptions** |
| ***srs-ResourceConfig***  SRS resources to be used for CLI measurements. |
| ***rssi-ResourceConfig***  CLI-RSSI resources to be used for CLI measurements. |

|  |
| --- |
| ***MeasObjectCLI* field descriptions** |
| ***cli-ResourceConfig***  SRS and/or CLI-RSSI resource configuration for CLI measurement. |

|  |
| --- |
| ***SRS-ResourceConfigCLI* field descriptions** |
| ***refBWP***  DL BWP id that is used to derive the reference point of the SRS resource (see TS 38.211[16], clause 6.4.1.4.3) |
| ***refServCellIndex***  The index of the reference serving cell that the *refBWP* belongs to. If this field is absent, the reference serving cell is PCell. |
| ***srs-SCS***  Subcarrier spacing for SRS.  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 |

|  |
| --- |
| ***RSSI-ResourceConfigCLI* field descriptions** |
| ***nrofPRBs***  Allowed size of the measurement BW. Only multiples of 4 are allowed. The smallest configurable number is the minimum of 4 and the width of the active DL BWP. If the configured value is larger than the width of the active DL BWP, the UE shall assume that the actual CLI-RSSI resource bandwidth is within the active DL BWP. |
| ***nrofSymbols***  Within a slot that is configured for CLI-RSSI measurement (see slotConfiguration), the UE measures the RSSI from *startPosition* to *startPosition* + *nrofSymbols* - 1. The configured CLI-RSSI resource does not exceed the slot boundary of the reference SCS. If the SCS of configured DL BWP(s) is larger than the reference SCS, network configures *startPosition* and *nrofSymbols* such that the configured CLI-RSSI resource not to exceed the slot boundary corresponding to the configured BWP SCS. If the reference SCS is larger than SCS of configured DL BWP(s), network ensures *startPosition* and *nrofSymbols* are integer multiple of reference SCS divided by configured BWP SCS. |
| ***refServCellIndex***  The index of the reference serving cell. Frequency reference point of the RSSI resource is subcarrier 0 of CRB0 of the reference serving cell. If this field is absent, the reference serving cell is PCell. |
| ***rssi-PeriodicityAndOffset***  Periodicity and slot offset for this CLI-RSSI resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. |
| ***rssi-SCS***  Reference subcarrier spacing for CLI-RSSI measurement.  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  UE performs CLI-RSSI measurement with the SCS of the active bandwidth part within the configured CLI-RSSI resource in the active BWP regardless of the reference SCS of the measurement resource. |
| ***startPosition***  OFDM symbol location of the CLI-RSSI resource within a slot. |
| ***startPRB***  Starting PRB index of the measurement bandwidth. For the case where the reference subcarrier spacing is smaller than subcarrier spacing of active DL BWP(s), network configures startPRB and nrofPRBs are as a multiple of active BW SCS divided by reference SCS. |

< Unmodified parts omitted >

*– MeasObjectNR*

The IE *MeasObjectNR* specifies information applicable for SS/PBCH block(s) intra/inter-frequency measurements and/or CSI-RS intra/inter-frequency measurements.

***MeasObjectNR* information element**

-- ASN1START

-- TAG-MEASOBJECTNR-START

MeasObjectNR ::= SEQUENCE {

ssbFrequency ARFCN-ValueNR OPTIONAL, -- Cond SSBorAssociatedSSB

ssbSubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond SSBorAssociatedSSB

smtc1 SSB-MTC OPTIONAL, -- Cond SSBorAssociatedSSB

smtc2 SSB-MTC2 OPTIONAL, -- Cond IntraFreqConnected

refFreqCSI-RS ARFCN-ValueNR OPTIONAL, -- Cond CSI-RS

referenceSignalConfig ReferenceSignalConfig,

absThreshSS-BlocksConsolidation ThresholdNR OPTIONAL, -- Need R

absThreshCSI-RS-Consolidation ThresholdNR OPTIONAL, -- Need R

nrofSS-BlocksToAverage INTEGER (2..maxNrofSS-BlocksToAverage) OPTIONAL, -- Need R

nrofCSI-RS-ResourcesToAverage INTEGER (2..maxNrofCSI-RS-ResourcesToAverage) OPTIONAL, -- Need R

quantityConfigIndex INTEGER (1..maxNrofQuantityConfig),

offsetMO Q-OffsetRangeList,

cellsToRemoveList PCI-List OPTIONAL, -- Need N

cellsToAddModList CellsToAddModList OPTIONAL, -- Need N

blackCellsToRemoveList PCI-RangeIndexList OPTIONAL, -- Need N

blackCellsToAddModList SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement OPTIONAL, -- Need N

whiteCellsToRemoveList PCI-RangeIndexList OPTIONAL, -- Need N

whiteCellsToAddModList SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement OPTIONAL, -- Need N

...,

[[

freqBandIndicatorNR FreqBandIndicatorNR OPTIONAL, -- Need R

measCycleSCell ENUMERATED {sf160, sf256, sf320, sf512, sf640, sf1024, sf1280} OPTIONAL -- Need R

]],

[[

smtc3list-r16 SSB-MTC3List-r16 OPTIONAL, -- Need R

rmtc-Config-r16 SetupRelease {RMTC-Config-r16} OPTIONAL, -- Need M

t312-r16 SetupRelease { T312-r16 } OPTIONAL -- Need M

]]

}

SSB-MTC3List-r16::= SEQUENCE (SIZE(1..4)) OF SSB-MTC3-r16

T312-r16 ::= ENUMERATED { ms0, ms50, ms100, ms200, ms300, ms400, ms500, ms1000}

ReferenceSignalConfig::= SEQUENCE {

ssb-ConfigMobility SSB-ConfigMobility OPTIONAL, -- Need M

csi-rs-ResourceConfigMobility SetupRelease { CSI-RS-ResourceConfigMobility } OPTIONAL -- Need M

}

SSB-ConfigMobility::= SEQUENCE {

ssb-ToMeasure SetupRelease { SSB-ToMeasure } OPTIONAL, -- Need M

deriveSSB-IndexFromCell BOOLEAN,

ss-RSSI-Measurement SS-RSSI-Measurement OPTIONAL, -- Need M

...,

[[

ssb-PositionQCL-Common-r16 SSB-PositionQCL-Relation-r16 OPTIONAL, -- Cond SharedSpectrum

ssb-PositionQCL-CellsToAddModList-r16 SSB-PositionQCL-CellsToAddModList-r16 OPTIONAL, -- Need N

ssb-PositionQCL-CellsToRemoveList-r16 PCI-List OPTIONAL -- Need N

]]

}

Q-OffsetRangeList ::= SEQUENCE {

rsrpOffsetSSB Q-OffsetRange DEFAULT dB0,

rsrqOffsetSSB Q-OffsetRange DEFAULT dB0,

sinrOffsetSSB Q-OffsetRange DEFAULT dB0,

rsrpOffsetCSI-RS Q-OffsetRange DEFAULT dB0,

rsrqOffsetCSI-RS Q-OffsetRange DEFAULT dB0,

sinrOffsetCSI-RS Q-OffsetRange DEFAULT dB0

}

ThresholdNR ::= SEQUENCE{

thresholdRSRP RSRP-Range OPTIONAL, -- Need R

thresholdRSRQ RSRQ-Range OPTIONAL, -- Need R

thresholdSINR SINR-Range OPTIONAL -- Need R

}

CellsToAddModList ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddMod

CellsToAddMod ::= SEQUENCE {

physCellId PhysCellId,

cellIndividualOffset Q-OffsetRangeList

}

RMTC-Config-r16 ::= SEQUENCE {

rmtc-Periodicity-r16 ENUMERATED {ms40, ms80, ms160, ms320, ms640},

rmtc-SubframeOffset-r16 INTEGER(0..639) OPTIONAL, -- Need M

measDurationSymbols-r16 ENUMERATED {sym1, sym14or12, sym28or24, sym42or36, sym70or60},

rmtc-Frequency-r16 ARFCN-ValueNR,

ref-SCS-CP-r16 ENUMERATED {kHz15, kHz30, kHz60-NCP, kHz60-ECP},

...,

[[

rmtc-Bandwidth-r17 ENUMERATED {mhz100, mhz400, mhz800, mhz1600, mhz2000} OPTIONAL, -- Need R

measDurationSymbols-v17xy ENUMERATED {sym140, sym560, sym1120} OPTIONAL, -- Need R

ref-SCS-CP-v17xy ENUMERATED {kHz120, kHz480, kHz960} OPTIONAL -- Need R

]]

}

SSB-PositionQCL-CellsToAddModList-r16 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF SSB-PositionQCL-CellsToAddMod-r16

SSB-PositionQCL-CellsToAddMod-r16 ::= SEQUENCE {

physCellId-r16 PhysCellId,

ssb-PositionQCL-r16 SSB-PositionQCL-Relation-r16

}

-- TAG-MEASOBJECTNR-STOP

-- ASN1STOP

Editor’s note: The rmtc-Bandwidth-r17 needs RAN4 confirmation.

|  |
| --- |
| ***CellsToAddMod* field descriptions** |
| ***cellIndividualOffset***  Cell individual offsets applicable to a specific cell. |
| ***physCellId***  Physical cell identity of a cell in the cell list. |

|  |
| --- |
| ***MeasObjectNR* field descriptions** |
| ***absThreshCSI-RS-Consolidation***  Absolute threshold for the consolidation of measurement results per CSI-RS resource(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per CSI-RS resource as described in 5.5.5.2. |
| ***absThreshSS-BlocksConsolidation***  Absolute threshold for the consolidation of measurement results per SS/PBCH block(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per SS/PBCH block index as described in 5.5.5.2. |
| ***blackCellsToAddModList***  List of cells to add/modify in the black list of cells. It applies only to SSB resources. |
| ***blackCellsToRemoveList***  List of cells to remove from the black list of cells. |
| ***cellsToAddModList***  List of cells to add/modify in the cell list. |
| ***cellsToRemoveList***  List of cells to remove from the cell list. |
| ***freqBandIndicatorNR***  The frequency band in which the SSB and/or CSI-RS indicated in this *MeasObjectNR* are located and according to which the UE shall perform the RRM measurements. This field is always provided when the network configures measurements with this *MeasObjectNR*. |
| ***measCycleSCell***  The parameter is used only when an SCell is configured on the frequency indicated by the measObjectNR and is in deactivated state, see TS 38.133 [14]. gNB configures the parameter whenever an SCell is configured on the frequency indicated by the *measObjectNR*, but the field may also be signalled when an SCell is not configured. Value *sf160* corresponds to 160 sub-frames, value *sf256* corresponds to 256 sub-frames and so on. |
| ***nrofCSInrofCSI-RS-ResourcesToAverage***  Indicates the maximum number of measurement results per beam based on CSI-RS resources to be averaged. The same value applies for each detected cell associated with this *MeasObjectNR*. |
| ***nrofSS-BlocksToAverage***  Indicates the maximum number of measurement results per beam based on SS/PBCH blocks to be averaged. The same value applies for each detected cell associated with this *MeasObject*. |
| ***offsetMO***  Offset values applicable to all measured cells with reference signal(s) indicated in this *MeasObjectNR*. |
| ***quantityConfigIndex***  Indicates the n-*th* element of *quantityConfigNR-List* provided in *MeasConfig*. |
| ***referenceSignalConfig***  RS configuration for SS/PBCH block and CSI-RS. |
| ***refFreqCSI-RS***  Point A which is used for mapping of CSI-RS to physical resources according to TS 38.211 [16] clause 7.4.1.5.3. |
| ***smtc1***  Primary measurement timing configuration. (see clause 5.5.2.10). |
| ***smtc2***  Secondary measurement timing configuration for SS corresponding to this *MeasObjectNR* with PCI listed in *pci-List*. For these SS, the periodicity is indicated by *periodicity* in *smtc2* and the timing offset is equal to the offset indicated in *periodicityAndOffset* modulo *periodicity*. *periodicity* in smtc2 can only be set to a value strictly shorter than the periodicity indicated by *periodicityAndOffset* in *smtc1* (e.g. if *periodicityAndOffset* indicates *sf10*, *periodicity* can only be set of *sf5*, if *periodicityAndOffset* indicates *sf5*, *smtc2* cannot be configured). |
| ***smtc3list***  Measurement timing configuration list for SS corresponding to IAB-MT. This is used for the IAB-node's discovery of other IAB-nodes and the IAB-Donor-DUs. |
| ***ssbFrequency*** Indicates the frequency of the SS associated to this *MeasObjectNR*. For operation with shared spectrum channel access, this field is a k\*30 kHz shift from the sync raster where k = 0,1,2, and so on if the *reportType* within the corresponding *ReportConfigNR* is set to reportCGI (see TS 38.211 [16], clause 7.4.3.1). Frequencies are considered to be on the sync raster if they are also identifiable with a GSCN value (see TS 38.101-1 [15]). |
| ***ssb-PositionQCL-Common***  Indicates the QCL relationship between SS/PBCH blocks for all measured cells as specified in TS 38.213 [13], clause 4.1. |
| ***ssbSubcarrierSpacing***  Subcarrier spacing of SSB.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |
| ***t312***  The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on. |
| ***whiteCellsToAddModList***  List of cells to add/modify in the white list of cells. It applies only to SSB resources. |
| ***whiteCellsToRemoveList***  List of cells to remove from the white list of cells. |

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| --- |
| ***RMTC-Config* field descriptions** |
| ***measDurationSymbols***  Number of consecutive symbols for which the Physical Layer reports samples of RSSI (see TS 38.215 [9], clause 5.1.21). Value *sym1* corresponds to one symbol, *sym14or12* corresponds to 14 symbols of the reference numerology for NCP and 12 symbols for ECP, and so on.  If *measDurationSymbols-v17xy* is signalled, the UE ignores *measDurationSymbols-r16.* |
| ***ref-SCS-CP***  Indicates a reference subcarrier spacing and cyclic prefix to be used for RSSI measurements (see TS 38.215 [9]). Value kHz15 corresponds to 15kHz, kHz30 corresponds to 30 kHz, value kHz60-NCP corresponds to 60 kHz using normal cyclic prefix (NCP), and kHz60-ECP corresponds to 60 kHz using extended cyclic prefix (ECP).  If *ref-SCS-CP-v17xy* is signalled, the UE ignores *ref-SCS-CP-r16.* |
| ***rmtc-Bandwidth***  Indicates the bandwidth for the RSSI measurement (see TS 38. 215 [9], clause 5.1.21). |
| ***rmtc-Frequency***  Indicates the center frequency of the measured bandwidth (see TS 38. 215 [9], clause 5.1.21). |
| ***rmtc-Periodicity***  Indicates the RSSI measurement timing configuration (RMTC) periodicity (see TS 38.215 [9], clause 5.1.21). |
| ***rmtc-SubframeOffset***  Indicates the RSSI measurement timing configuration (RMTC) subframe offset for this frequency (see TS 38.215 [9], clause 5.1.21). For inter-frequency measurements, this field is optional present and if it is not configured, the UE chooses a random value as *rmtc-SubframeOffset* for *measDurationSymbols* which shall be selected to be between 0 and the configured *rmtc-Periodicity* with equal probability. |

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| ***ReferenceSignalConfig* field descriptions** |
| ***csi-rs-ResourceConfigMobility***  CSI-RS resources to be used for CSI-RS based RRM measurements. |
| ***ssb-ConfigMobility***  SSB configuration for mobility (nominal SSBs, timing configuration). |

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| --- |
| ***SSB-ConfigMobility* field descriptions** |
| ***deriveSSB-IndexFromCell***  If this field is set to *true*, UE assumes SFN and frame boundary alignment across cells on the same frequency carrier as specified in TS 38.133 [14]. Hence, if the UE is configured with a serving cell for which (*absoluteFrequencySSB*, *subcarrierSpacing*) in *ServingCellConfigCommon* is equal to (*ssbFrequency*, *ssbSubcarrierSpacing*) in this *MeasObjectNR*, this field indicates whether the UE can utilize the timing of this serving cell to derive the index of SS block transmitted by neighbour cell. Otherwise, this field indicates whether the UE may use the timing of any detected cell on that target frequency to derive the SSB index of all neighbour cells on that frequency. |
| ***ssb-ToMeasure***  The set of SS blocks to be measured within the SMTC measurement duration. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not to be measured while value 1 indicates that the corresponding SS/PBCH block is to be measured (see TS 38.215 [9]). When the field is not configured the UE measures on all SS blocks. Regardless of the value of this field, SS/PBCH blocks outside of the applicable *smtc* are not to be measured. See TS 38.215 [9] clause 5.1.1. |

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| ***SSB-PositionQCL-CellsToAddMod* field descriptions** |
| ***physCellId***  Physical cell identity of a cell in the cell list. |
| ***ssb-PositionQCL***  Indicates the QCL relation between SS/PBCH blocks for a specific cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by *ssb-PositionQCL-Common*. |

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| **Conditional Presence** | **Explanation** |
| *CSI-RS* | This field is mandatory present if *csi-rs-ResourceConfigMobility* is configured, otherwise, it is absent. |
| *SSBorAssociatedSSB* | This field is mandatory present if *ssb-ConfigMobility* is configured or *associatedSSB* is configured in at least one cell. Otherwise, it is absent, Need R. |
| *IntraFreqConnected* | This field is optionally present, Need R if the UE is configured with a serving cell for which (absoluteFrequencySSB, subcarrierSpacing) in ServingCellConfigCommon is equal to (*ssbFrequency*, *ssbSubcarrierSpacing*) in this *MeasObjectNR*, otherwise, it is absent. |
| *SharedSpectrum* | This field is mandatory present if this *MeasObject* is for a frequency which operates with shared spectrum channel access. Otherwise, it is absent, Need R. |

< Unmodified parts omitted >

– *PDCCH-Config*

The IE *PDCCH-Config* is used to configure UE specific PDCCH parameters such as control resource sets (CORESET), search spaces and additional parameters for acquiring the PDCCH. If this IE is used for the scheduled cell in case of cross carrier scheduling, the fields other than *searchSpacesToAddModList* and *searchSpacesToReleaseList* are absent. If the IE is used for a dormant BWP, the fields other than *controlResourceSetToAddModList* and *controlResourceSetToReleaseList* are absent.

***PDCCH-Config* information element**

-- ASN1START

-- TAG-PDCCH-CONFIG-START

PDCCH-Config ::= SEQUENCE {

controlResourceSetToAddModList SEQUENCE(SIZE (1..3)) OF ControlResourceSet OPTIONAL, -- Need N

controlResourceSetToReleaseList SEQUENCE(SIZE (1..3)) OF ControlResourceSetId OPTIONAL, -- Need N

searchSpacesToAddModList SEQUENCE(SIZE (1..10)) OF SearchSpace OPTIONAL, -- Need N

searchSpacesToReleaseList SEQUENCE(SIZE (1..10)) OF SearchSpaceId OPTIONAL, -- Need N

downlinkPreemption SetupRelease { DownlinkPreemption } OPTIONAL, -- Need M

tpc-PUSCH SetupRelease { PUSCH-TPC-CommandConfig } OPTIONAL, -- Need M

tpc-PUCCH SetupRelease { PUCCH-TPC-CommandConfig } OPTIONAL, -- Need M

tpc-SRS SetupRelease { SRS-TPC-CommandConfig} OPTIONAL, -- Need M

...,

[[

controlResourceSetToAddModListSizeExt-v1610 SEQUENCE (SIZE (1..2)) OF ControlResourceSet OPTIONAL, -- Need N

controlResourceSetToReleaseListSizeExt-r16 SEQUENCE (SIZE (1..5)) OF ControlResourceSetId-r16 OPTIONAL, -- Need N

searchSpacesToAddModListExt-r16 SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-r16 OPTIONAL, -- Need N

uplinkCancellation-r16 SetupRelease { UplinkCancellation-r16 } OPTIONAL, -- Need M

monitoringCapabilityConfig-r16 ENUMERATED { r15monitoringcapability,r16monitoringcapability } OPTIONAL, -- Need M

searchSpaceSwitchConfig-r16 SearchSpaceSwitchConfig-r16 OPTIONAL -- Need R

]],

[[

monitoringCapabilityConfig-r17 ENUMERATED { r15monitoringcapability, r16monitoringcapability, r17monitoringcapability } OPTIONAL, -- Need M

searchSpacesToAddModListExt2-r17 SEQUENCE(SIZE (1..10)) OF SearchSpaceExt2-r17 OPTIONAL -- Need N

]]

}

SearchSpaceSwitchConfig-r16 ::= SEQUENCE {

cellGroupsForSwitchList-r16 SEQUENCE(SIZE (1..4)) OF CellGroupForSwitch-r16 OPTIONAL, -- Need R

searchSpaceSwitchDelay-r16 INTEGER (10..52) OPTIONAL -- Need R

}

CellGroupForSwitch-r16 ::= SEQUENCE(SIZE (1..16)) OF ServCellIndex

-- TAG-PDCCH-CONFIG-STOP

-- ASN1STOP

Editor’s note: *searchSpacesToAddModListExt2* may need to be added to *PDCCH-ConfigCommon* as well

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| ***PDCCH-Config* field descriptions** |
| ***controlResourceSetToAddModList, controlResourceSetToAddModListSizeExt***  List of UE specifically configured Control Resource Sets (CORESETs) to be used by the UE. The network restrictions on configuration of CORESETs per DL BWP are specified in TS 38.213 [13], clause 10.1 and TS 38.306 [26]. The UE shall consider entries in *controlResourceSetToAddModList* and in *controlResourceSetToAddModListSizeExt* as a single list, i.e. an entry created using *controlResourceSetToAddModList* can be modifed using *controlResourceSetToAddModListSizeExt* (or deleted using *controlResourceSetToReleaseListSizeExt*) and vice-versa. In case network reconfigures control resource set with the same *ControlResourceSetId* as used for *commonControlResourceSet* configured via *PDCCH-ConfigCommon*, the configuration from *PDCCH-Config* always takes precedence and should not be updated by the UE based on *servingCellConfigCommon*. |
| ***controlResourceSetToReleaseList, controlResourceSetToReleaseListSizeExt***  List of UE specifically configured Control Resource Sets (CORESETs) to be released by the UE. This field only applies to CORESETs configured by *controlResourceSetToAddModList* or *controlResourceSetToAddModListSizeExt* and does not release the field *commonControlResourceSet* configured by *PDCCH-ConfigCommon*. |
| ***downlinkPreemption***  Configuration of downlink preemption indications to be monitored in this cell (see TS 38.213 [13], clause 11.2). |
| ***monitoringCapabilityConfig***  Configures either Rel-15 PDCCH monitoring capability or Rel-16 PDCCH monitoring capability for PDCCH monitoring on a serving cell. Value *r15monitoringcapablity* enables the Rel-15 monitoring capability, and value *r16monitoringcapablity* enables the Rel-16 PDCCH monitoring capability (see TS 38.213 [13], clause 10.1). r17monitoringcapability enables the Rel-17 PDCCH multi-slot monitoring capability (see TS 38.213 [13], clause 10.1). For 480 and 960 kHz SCS, only value r17monitoringcapability is applicable. |
| ***searchSpacesToAddModList, searchSpacesToAddModListExt***  List of UE specifically configured Search Spaces. The network configures at most 10 Search Spaces per BWP per cell (including UE-specific and common Search Spaces). If the network includes searchSpaceToAddModListExt, it includes the same number of entries, and listed in the same order, as in searchSpacesToAddModList. |
| ***tpc-PUCCH***  Enable and configure reception of group TPC commands for PUCCH. |
| ***tpc-PUSCH***  Enable and configure reception of group TPC commands for PUSCH. |
| ***tpc-SRS***  Enable and configure reception of group TPC commands for SRS. |
| ***uplinkCancellation***  Configuration of uplink cancellation indications to be monitored in this cell (see TS 38.213 [13], clause 11.2A). |

|  |
| --- |
| ***SearchSpaceSwitchConfig* field descriptions** |
| ***cellGroupsForSwitchList***  The list of serving cells which are bundled for the search space group switching purpose (see TS 38.213 [13], clause 10.4). A serving cell can belong to only one *CellGroupForSwitch*. The network configures the same list for all BWPs of serving cells in the same *CellGroupForSwitch.* |
| ***searchSpaceSwitchDelay***  Indicates the value to be applied by a UE for Search Space Set Group switching; corresponds to the P value in TS 38.213 [13], clause 10.4. The network configures the same value for all BWPs of serving cells in the same *CellGroupForSwitch.* |

< Unmodified parts omitted >

– *PDSCH-Config*

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

***PDSCH-Config* information element**

-- ASN1START

-- TAG-PDSCH-CONFIG-START

PDSCH-Config ::= SEQUENCE {

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

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

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

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

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

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

resourceAllocation ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},

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

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

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

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

rateMatchPatternGroup1 RateMatchPatternGroup OPTIONAL, -- Need R

rateMatchPatternGroup2 RateMatchPatternGroup OPTIONAL, -- Need R

rbg-Size ENUMERATED {config1, config2},

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

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

prb-BundlingType CHOICE {

staticBundling SEQUENCE {

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

},

dynamicBundling SEQUENCE {

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

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

}

},

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need M

...,

[[

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

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

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

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

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

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

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

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

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

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

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

OPTIONAL, -- Need M

prb-BundlingTypeDCI-1-2-r16 CHOICE {

staticBundling-r16 SEQUENCE {

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

},

dynamicBundling-r16 SEQUENCE {

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

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

}

} OPTIONAL, -- Need R

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

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

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

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

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

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

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

OPTIONAL, -- Need M

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

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

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

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

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

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[[

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

]],

[[

pdsch-TimeDomainAllocationListForMultiPDSCH-r17 SetupRelease { PDSCH-TimeDomainResourceAllocationList-r17 } OPTIONAL, -- Need M

pdsch-TimeDomainAllocationList-r17 SetupRelease { PDSCH-TimeDomainResourceAllocationList-r17 } OPTIONAL, -- Need M

pdsch-TimeDomainAllocationListDCI-1-2-r17 SetupRelease { PDSCH-TimeDomainResourceAllocationList-r17 } OPTIONAL, -- Need M

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

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

]]

}

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

cellLevel RateMatchPatternId,

bwpLevel RateMatchPatternId

}

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

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

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

-- TAG-PDSCH-CONFIG-STOP

-- ASN1STOP

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| --- |
| ***PDSCH-Config* field descriptions** |
| ***antennaPortsFieldPresenceDCI-1-2***  Configure the presence of "Antenna ports" field in DCI format 1\_2. When the field is configured, then the "Antenna ports" field is present in DCI format 1\_2. Otherwise, the field size is set to 0 for DCI format 1\_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2* nor *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2* is configured, this field is absent. |
| ***aperiodic-ZP-CSI-RS-ResourceSetsToAddModList, aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2***  AddMod/Release lists for configuring aperiodically triggered zero-power CSI-RS resource sets. Each set contains a *ZP-CSI-RS-ResourceSetId* and the IDs of one or more *ZP-CSI-RS-Resources* (the actual resources are defined in the *zp-CSI-RS-ResourceToAddModList*). The network configures the UE with at most 3 aperiodic *ZP-CSI-RS-ResourceSets* and it uses only the *ZP-CSI-RS-ResourceSetId* 1 to 3. The network triggers a set by indicating its *ZP-CSI-RS-ResourceSetId* in the DCI payload. The DCI codepoint '01' triggers the resource set with *ZP-CSI-RS-ResourceSetId* 1, the DCI codepoint '10' triggers the resource set with *ZP-CSI-RS-ResourceSetId 2*, and the DCI codepoint '11' triggers the resource set with *ZP-CSI-RS-ResourceSetId* 3 (see TS 38.214 [19], clause 5.1.4.2). The field *aperiodic-ZP-CSI-RS-ResourceSetsToAddModList* applies to DCI format 1\_1 and the field *aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.4.2 and TS 38.212 [17] clause 7.3.1). |
| ***dataScramblingIdentityPDSCH, dataScramblingIdentityPDSCH2***  Identifier(s) used to initialize data scrambling (c\_init) for PDSCH as specified in TS 38.211 [16], clause 7.3.1.1. The *dataScramblingIdentityPDSCH2* is configured if *coresetPoolIndex* is configured with 1 for at least one CORESET in the same BWP. |
| ***dmrs-DownlinkForPDSCH-MappingTypeA, dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2***  DMRS configuration for PDSCH transmissions using PDSCH mapping type A (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeA* applies to DCI format 1\_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2* applies to DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-DownlinkForPDSCH-MappingTypeB, dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2***  DMRS configuration for PDSCH transmissions using PDSCH mapping type B (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeB* applies to DCI format 1\_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2* applies to DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-FD-OCC-DisabledForRank1-PDSCH***  If configured, the UE may assume that the set of remaining orthogonal antenna ports, which are within the same code division multiplexing (CDM) group and have different frequency domain orthogonal cover codes (FD-OCC), are not associated with the PDSCH of another UE (see TS 38.214 [19], clause 5.1.6.2). It is applicable for PDSCH SCS of 480 and 960 kHz when rank 1 PDSCH with type-1 or type-2 DMRS is scheduled. |
| ***dmrs-SequenceInitializationDCI-1\_2***  Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 1\_2 If the field is absent, then the UE applies the value of 0 bit for the field "DMRS Sequence Initialization" in DCI format 1\_2. If the field is present, then the UE applies the value of 1 bit as in DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***harq-ProcessNumberSizeDCI-1-2***  Configure the number of bits for the field "HARQ process number" in DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***maxMIMO-Layers***  Indicates the maximum number of MIMO layers to be used for PDSCH in this DL BWP. If not configured, the UE uses the *maxMIMO-Layers* configuration in IE *PDSCH-ServingCellConfig* of the serving cell to which this BWP belongs, when the UE operates in this BWP. The value of *maxMIMO-Layers* for a DL BWP shall be smaller than or equal to the value of *maxMIMO-Layers* configured in IE *PDSCH-ServingCellConfig* of the serving cell to which this BWP belongs. |
| ***maxNrofCodeWordsScheduledByDCI***  Maximum number of code words that a single DCI may schedule. This changes the number of MCS/RV/NDI bits in the DCI message from 1 to 2. |
| ***mcs-Table, mcs-TableDCI-1-2***  Indicates which MCS table the UE shall use for PDSCH. (see TS 38.214 [19], clause 5.1.3.1). If the field is absent the UE applies the value 64QAM. The field *mcs-Table* applies to DCI format 1\_0 and DCI format 1\_1, and the field *mcs-TableDCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.3.1). |
| ***minimumSchedulingOffsetK0***  List of minimum K0 values. Minimum K0 parameter denotes minimum applicable value(s) for the TDRA table for PDSCH and for A-CSI RS triggering Offset(s) (see TS 38.214 [19], clause 5.3.1). |
| ***numberOfBitsForRV-DCI-1-2***  Configures the number of bits for "Redundancy version" in the DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.1). |
| ***pdsch-AggregationFactor***  Number of repetitions for data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent the UE applies the value 1. |
| ***pdsch-TimeDomainAllocationList, pdsch-TimeDomainAllocationListDCI-1-2, pdsch-TimeDomainAllocationListForMultiPDSCH***  List of time-domain configurations for timing of DL assignment to DL data.  The field *pdsch-TimeDomainAllocationList* (with or without suffix) applies to DCI format 1\_0 and DCI format 1\_1 (see table 5.1.2.1.1-1 in TS 38.214 [19]), and if the field *pdsch-TimeDomainAllocationListDCI-1-2* is not configured, to DCI format 1\_2. If the field *pdsch-TimeDomainAllocationListDCI-1-2* is configured, it applies to DCI format 1\_2 (see table 5.1.2.1.1-1A in TS 38.214 [19]). The field *pdsch-TimeDomainAllocationListForMultiPDSCH* applies to DCI format 1\_1.  The network does not configure the *pdsch-TimeDomainAllocationList-r16* simultaneously with the *pdsch-TimeDomainAllocationList* (without suffix) in the same *PDSCH-Config*. |
| ***prb-BundlingType,*** ***prb-BundlingTypeDCI-1-2***  Indicates the PRB bundle type and bundle size(s) (see TS 38.214 [19], clause 5.1.2.3). If *dynamic* is chosen, the actual *bundleSizeSet1 or bundleSizeSet2* to use is indicated via DCI. Constraints on *bundleSize(Set)* setting depending on *vrb-ToPRB-Interleaver* and *rbg-Size* settings are described in TS 38.214 [19], clause 5.1.2.3. If a *bundleSize(Set)* value is absent, the UE applies the value *n2*. The field *prb-BundlingType* applies to DCI format 1\_1, and the field *prb-BundlingTypeDCI-1-2* applies to DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.3). |
| ***priorityIndicatorDCI-1-1, priorityIndicatorDCI-1-2***  Configure the presence of "priority indicator" in DCI format 1\_1/1\_2. When the field is absent in the IE, then 0 bit for "priority indicator" in DCI format 1\_1/1\_2. The field *priorityIndicatorDCI-1-1* applies to DCI format 1\_1 and the field *priorityIndicatorDCI-1-2* applies to DCI format 1\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9). |
| ***p-ZP-CSI-RS-ResourceSet***  A set of periodically occurring ZP-CSI-RS-Resources (the actual resources are defined in the zp-CSI-RS-ResourceToAddModList). The network uses the ZP-CSI-RS-ResourceSetId=0 for this set. |
| ***rateMatchPatternGroup1, rateMatchPatternGroup1DCI-1-2***  The IDs of a first group of *RateMatchPatterns* defined in *PDSCH-Config*->*rateMatchPatternToAddModList* (BWP level) or in *ServingCellConfig* ->*rateMatchPatternToAddModLis*t (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field *rateMatchPatternGroup1* applies to DCI format 1\_1, and the field *rateMatchPatternGroup1DCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.4.1). |
| ***rateMatchPatternGroup2, rateMatchPatternGroup2DCI-1-2***  The IDs of a second group of *RateMatchPatterns* defined in *PDSCH-Config*->*rateMatchPatternToAddModList* (BWP level) or in *ServingCellConfig* ->*rateMatchPatternToAddModLis*t (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field *rateMatchPatternGroup2* applies to DCI format 1\_1, and the field *rateMatchPatternGroup2DCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.4.1). |
| ***rateMatchPatternToAddModList***  Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns (see TS 38.214 [19], clause 5.1.4.1). |
| ***rbg-Size***  Selection between config 1 and config 2 for RBG size for PDSCH. The UE ignores this field if *resourceAllocation* is set to *resourceAllocationType1* (see TS 38.214 [19], clause 5.1.2.2.1). |
| ***referenceOfSLIVDCI-1-2***  Enable using the starting symbol of the PDCCH monitoring occasion in which the DL assignment is detected as the reference of the SLIV for DCI format 1\_2. When the RRC parameter enables the utilization of the new reference, the new reference is applied for TDRA entries with K0=0. For other entries (if any) in the same TDRA table, the reference is slot boundary as in Rel-15. PDSCH mapping type A is not supported with the new reference. The new reference of SLIV is not configured for a serving cell configured to be scheduled by cross-carrier scheduling on a scheduling cell with different numerology (see TS 38.212 [17] clause 7.3.1 and TS 38.214 [19] clause 5.1.2.1). |
| ***repetitionSchemeConfig***  Configure the UE with repetition schemes. The network does not configure *repetitionSchemeConfig-r16* and *repetitionSchemeConfig-v1630* simultaneously to *setup* in the same *PDSCH-Config*. |
| ***resourceAllocation, resourceAllocationDCI-1-2***  Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 5.1.2.2). The field *resourceAllocation* applies to DCI format 1\_1, and the field *resourceAllocationDCI-1-2* applies to DCI format 1\_2 (see TS 38.214 [19], clause 5.1.2.2). |
| ***resourceAllocationType1GranularityDCI-1-2***  Configure the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 1\_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 5.1.2.2.2). |
| ***sp-ZP-CSI-RS-ResourceSetsToAddModList***  AddMod/Release lists for configuring semi-persistent zero-power CSI-RS resource sets. Each set contains a *ZP-CSI-RS-ResourceSetId* and the IDs of one or more *ZP-CSI-RS-Resources* (the actual resources are defined in the *zp-CSI-RS-ResourceToAddModList*) (see TS 38.214 [19], clause 5.1.4.2). |
| ***tci-StatesToAddModList***  A list of Transmission Configuration Indicator (TCI) states indicating a transmission configuration which includes QCL-relationships between the DL RSs in one RS set and the PDSCH DMRS ports (see TS 38.214 [19], clause 5.1.5). |
| ***vrb-ToPRB-Interleaver, vrb-ToPRB-InterleaverDCI-1-2***  Interleaving unit configurable between 2 and 4 PRBs (see TS 38.211 [16], clause 7.3.1.6). When the field is absent, the UE performs non-interleaved VRB-to-PRB mapping. The field *vrb-ToPRB-Interleaver* applies to DCI format 1\_1, and the field *vrb-ToPRB-InterleaverDCI-1-2* applies to DCI format 1\_2 (see TS 38.211 [16], clause 7.3.1.6). |
| ***zp-CSI-RS-ResourceToAddModList***  A list of Zero-Power (ZP) CSI-RS resources used for PDSCH rate-matching. Each resource in this list may be referred to from only one type of resource set, i.e., aperiodic, semi-persistent or periodic (see TS 38.214 [19]). |

< Unmodified parts omitted >

– *PDSCH-TimeDomainResourceAllocationList*

The IE *PDSCH-TimeDomainResourceAllocation* is used to configure a time domain relation between PDCCH and PDSCH. The *PDSCH-TimeDomainResourceAllocationList* contains one or more of such *PDSCH-TimeDomainResourceAllocations*. The network indicates in the DL assignment which of the configured time domain allocations the UE shall apply for that DL assignment. The UE determines the bit width of the DCI field based on the number of entries in the *PDSCH-TimeDomainResourceAllocationList*. Value 0 in the DCI field refers to the first element in this list, value 1 in the DCI field refers to the second element in this list, and so on.

***PDSCH-TimeDomainResourceAllocationList* information element**

-- ASN1START

-- TAG-PDSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-START

PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation

PDSCH-TimeDomainResourceAllocation ::= SEQUENCE {

k0 INTEGER(0..32) OPTIONAL, -- Need S

mappingType ENUMERATED {typeA, typeB},

startSymbolAndLength INTEGER (0..127)

}

PDSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation-r16

PDSCH-TimeDomainResourceAllocation-r16 ::= SEQUENCE {

k0-r16 INTEGER(0..32) OPTIONAL, -- Need S

mappingType-r16 ENUMERATED {typeA, typeB},

startSymbolAndLength-r16 INTEGER (0..127),

repetitionNumber-r16 ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16} OPTIONAL, -- Cond Formats1-0and1-1

...

}

PDSCH-TimeDomainResourceAllocationList-r17 ::= SEQUENCE (SIZE(1.. maxNrofDL-Allocations)) OF MultiPDSCH-TimeDomainResourceAllocation-r17

MultiPDSCH-TimeDomainResourceAllocation-r17 ::= SEQUENCE {

pdsch-AllocationList-r17 SEQUENCE (SIZE(1..maxNrofMultiplePDSCHs-r17)) OF PDSCH-TimeDomainResourceAllocation-r17,

...

}

PDSCH-TimeDomainResourceAllocation-r17 ::= SEQUENCE {

k0-r17 INTEGER (0..128) OPTIONAL, -- Need S

mappingType-r17 ENUMERATED {typeA, typeB},

startSymbolAndLength-r17 INTEGER (0..127),

repetitionNumber-r17 ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16} OPTIONAL, -- Cond Formats1-0and1-1

...

}

-- TAG-PDSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP

-- ASN1STOP

|  |
| --- |
| ***PDSCH-TimeDomainResourceAllocation* field descriptions** |
| ***k0***  Slot offset between DCI and its scheduled PDSCH (see TS 38.214 [19], clause 5.1.2.1). For k0-r17, only values {0..32} are applicable for PDSCH SCS of 120 kHz. When the field is absent the UE applies the value 0. |
| ***mappingType***  PDSCH mapping type. (see TS 38.214 [19], clause 5.3). |
| ***repetitionNumber***  Indicates the number of PDSCH transmission occasions for slot-based repetition scheme in IE *RepetitionSchemeConfig.* The parameter is used as specified in 38.214 [19]. |
| ***startSymbolAndLength***  An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV). The network configures the field so that the allocation does not cross the slot boundary (see TS 38.214 [19], clause 5.1.2.1). |

|  |
| --- |
| ***MultiPDSCH-TimeDomainResourceAllocation* field descriptions** |
| ***pdsch-AllocationList***  One or multiple PDSCHs which can be in consecutive or non-consecutive slots (see TS 38.214 [19], clause 5.1.2.1). |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Formats1-0and1-1* | In *pdsch-TimeDomainResourceAllocationList-r16*, this field is optionally present, Need R.  In *pdsch-TimeDomainResourceAllocationList-r17*, this field is optionally present, Need R.  In *pdsch-TimeDomainAllocationListDCI-1-2* and *pdsch-TimeDomainAllocationListForMultiPDSCH*, this field is absent. |

< Unmodified parts omitted >

– *PUCCH-Config*

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

***PUCCH-Config* information element**

-- ASN1START

-- TAG-PUCCH-CONFIG-START

PUCCH-Config ::= SEQUENCE {

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

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

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

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

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

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

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

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

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

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

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

...,

[[

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

dl-DataToUL-ACK-r16 SetupRelease { DL-DataToUL-ACK-r16 } OPTIONAL, -- Need M

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

subslotLengthForPUCCH-r16 CHOICE {

normalCP-r16 ENUMERATED {n2,n7},

extendedCP-r16 ENUMERATED {n2,n6}

} OPTIONAL, -- Need R

dl-DataToUL-ACK-DCI-1-2-r16 SetupRelease { DL-DataToUL-ACK-DCI-1-2-r16} OPTIONAL, -- Need M

numberOfBitsForPUCCH-ResourceIndicatorDCI-1-2-r16 INTEGER (0..3) OPTIONAL, -- Need R

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

spatialRelationInfoToAddModListSizeExt-v1610 SEQUENCE (SIZE (1..maxNrofSpatialRelationInfosDiff-r16)) OF PUCCH-SpatialRelationInfo

OPTIONAL, -- Need N

spatialRelationInfoToReleaseListSizeExt-v1610 SEQUENCE (SIZE (1..maxNrofSpatialRelationInfosDiff-r16)) OF PUCCH-SpatialRelationInfoId

OPTIONAL, -- Need N

spatialRelationInfoToAddModListExt-v1610 SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos-r16)) OF PUCCH-SpatialRelationInfoExt-r16

OPTIONAL, -- Need N

spatialRelationInfoToReleaseListExt-v1610 SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos-r16)) OF

PUCCH-SpatialRelationInfoId-r16 OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

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

OPTIONAL, -- Need N

sps-PUCCH-AN-List-r16 SetupRelease { SPS-PUCCH-AN-List-r16 } OPTIONAL, -- Need M

schedulingRequestResourceToAddModListExt-v1610 SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfigExt-v1610

OPTIONAL -- Need N

]],

[[

dl-DataToUL-ACK-r17 SetupRelease { DL-DataToUL-ACK-r17 } OPTIONAL, -- Need M

dl-DataToUL-ACK-DCI-1-2-r17 SetupRelease { DL-DataToUL-ACK-DCI-1-2-r17} OPTIONAL, -- Need M

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

schedulingRequestResourceToAddModListExt-v17xy SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfigExt-v17xy

OPTIONAL -- Need N

]]

}

PUCCH-FormatConfig ::= SEQUENCE {

interslotFrequencyHopping ENUMERATED {enabled} OPTIONAL, -- Need R

additionalDMRS ENUMERATED {true} OPTIONAL, -- Need R

maxCodeRate PUCCH-MaxCodeRate OPTIONAL, -- Need R

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

pi2BPSK ENUMERATED {enabled} OPTIONAL, -- Need R

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

}

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

-- A set with one or more PUCCH resources

PUCCH-ResourceSet ::= SEQUENCE {

pucch-ResourceSetId PUCCH-ResourceSetId,

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

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

}

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

PUCCH-Resource ::= SEQUENCE {

pucch-ResourceId PUCCH-ResourceId,

startingPRB PRB-Id,

intraSlotFrequencyHopping ENUMERATED { enabled } OPTIONAL, -- Need R

secondHopPRB PRB-Id OPTIONAL, -- Need R

format CHOICE {

format0 PUCCH-format0,

format1 PUCCH-format1,

format2 PUCCH-format2,

format3 PUCCH-format3,

format4 PUCCH-format4

}

}

PUCCH-ResourceExt-r16 ::= SEQUENCE {

interlaceAllocation-r16 SEQUENCE {

rb-SetIndex INTEGER (0..4),

interlace0 CHOICE {

scs15 INTEGER (0..9),

scs30 INTEGER (0..4)

}

} OPTIONAL, --Need R

formatExt-v1610 CHOICE {

interlace1-v1610 INTEGER (0..9),

occ-v1610 SEQUENCE {

occ-Length-v1610 ENUMERATED {n2,n4} OPTIONAL, -- Need M

occ-Index-v1610 ENUMERATED {n0,n1,n2,n3} OPTIONAL -- Need M

}

} OPTIONAL, -- Need R

...,

[[

formatExt-v17xx SEQUENCE {

nrofPRBs-r17 INTEGER (1..16)

} OPTIONAL -- Need R

]]

}

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

PUCCH-format0 ::= SEQUENCE {

initialCyclicShift INTEGER(0..11),

nrofSymbols INTEGER (1..2),

startingSymbolIndex INTEGER(0..13)

}

PUCCH-format1 ::= SEQUENCE {

initialCyclicShift INTEGER(0..11),

nrofSymbols INTEGER (4..14),

startingSymbolIndex INTEGER(0..10),

timeDomainOCC INTEGER(0..6)

}

PUCCH-format2 ::= SEQUENCE {

nrofPRBs INTEGER (1..16),

nrofSymbols INTEGER (1..2),

startingSymbolIndex INTEGER(0..13)

}

PUCCH-format3 ::= SEQUENCE {

nrofPRBs INTEGER (1..16),

nrofSymbols INTEGER (4..14),

startingSymbolIndex INTEGER(0..10)

}

PUCCH-format4 ::= SEQUENCE {

nrofSymbols INTEGER (4..14),

occ-Length ENUMERATED {n2,n4},

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

startingSymbolIndex INTEGER(0..10)

}

PUCCH-ResourceGroup-r16 ::= SEQUENCE {

pucch-ResourceGroupId-r16 PUCCH-ResourceGroupId-r16,

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

}

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

DL-DataToUL-ACK-r16 ::= SEQUENCE (SIZE (1..8)) OF INTEGER (-1..15)

DL-DataToUL-ACK-r17 ::= SEQUENCE (SIZE (1..8)) OF INTEGER (-1..127)

DL-DataToUL-ACK-DCI-1-2-r16 ::= SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)

DL-DataToUL-ACK-DCI-1-2-r17 ::= SEQUENCE (SIZE (1..8)) OF INTEGER (0..127)

UL-AccessConfigListDCI-1-1-r16 ::= SEQUENCE (SIZE (1..16)) OF INTEGER (0..15)

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

-- TAG-PUCCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***PUCCH-Config* field descriptions** |
| ***dl-DataToUL-ACK, dl-DataToUL-ACK-DCI-1-2***  List of timing for given PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field *dl-DataToUL-ACK* applies to DCI format 1\_1 and the field *dl-DataToUL-ACK-DCI-1-2* applies to DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3). If *dl-DataToUL-ACK-r16* or *dl-DataToUL-ACK-r17* is signalled, UE shall ignore the *dl-DataToUL-ACK* (without suffix). The value -1 corresponds to "non-numerical value" for the case where the A/N feedback timing is not explicitly included at the time of scheduling PDSCH.The fields *dl-DataToUL-ACK-r17* and *dl-DataToUL-ACK-DCI-1-2-r17* are only applicable for SCS of 480 kHz or 960 kHz. |
| ***dmrs-UplinkTransformPrecodingPUCCH***  This field is used for PUCCH formats 3 and 4 according to TS 38.211, Clause 6.4.1.3.3.1. |
| ***format1***  Parameters that are common for all PUCCH resources of format 1. |
| ***format2***  Parameters that are common for all PUCCH resources of format 2. |
| ***format3***  Parameters that are common for all PUCCH resources of format 3. |
| ***format4.***  Parameters that are common for all PUCCH resources of format 4 |
| ***numberOfBitsForPUCCH- ResourceIndicatorDCI-1-2***  Configuration of the number of bits for "PUCCH resource indicator" in DCI format 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3). |
| ***resourceGroupToAddModList, resourceGroupToReleaseList***  Lists for adding and releasing groups of PUCCH resources that can be updated simultaneously for spatial relations with a MAC CE |
| ***resourceSetToAddModList, resourceSetToReleaseList***  Lists for adding and releasing PUCCH resource sets (see TS 38.213 [13], clause 9.2). |
| ***resourceToAddModList, resourceToAddModListExt, resourceToReleaseList***  Lists for adding and releasing PUCCH resources applicable for the UL BWP and serving cell in which the *PUCCH-Config* is defined. The resources defined herein are referred to from other parts of the configuration to determine which resource the UE shall use for which report. If the network includes of *resourceToAddModListExt*, it includes the same number of entries, and listed in the same order, as in *resourceToAddModList*. |
| ***spatialRelationInfoToAddModList, spatialRelationInfoToAddModListSizeExt , spatialRelationInfoToAddModListExt***  Configuration of the spatial relation between a reference RS and PUCCH. Reference RS can be SSB/CSI-RS/SRS. If the list has more than one element, MAC-CE selects a single element (see TS 38.321 [3], clause 5.18.8 and TS 38.213 [13], clause 9.2.2). The UE shall consider entries in *spatialRelationInfoToAddModList* and in *spatialRelationInfoToAddModListSizeExt* as a single list, i.e. an entry created using *spatialRelationInfoToAddModList* can be modifed using *spatialRelationInfoToAddModListSizeExt* (or deleted using *spatialRelationInfoToReleaseListSizeExt*) and vice-versa. If the network includes *spatialRelationInfoToAddModListExt*, it includes the same number of entries, and listed in the same order, as in the concatenation of *spatialRelationInfoToAddModList* and of *spatialRelationInfoToAddModListSizeExt*. |
| ***spatialRelationInfoToReleaseList, spatialRelationInfoToReleaseListSizeExt, spatialRelationInfoToReleaseListExt***  Lists of spatial relation configurations between a reference RS and PUCCH to be released by the UE. |
| ***sps-PUCCH-AN-List***  Indicates a list of PUCCH resources for DL SPS HARQ ACK. The field *maxPayloadSize* is absent for the first and the last *SPS-PUCCH-AN* in the list. If configured, this overrides *n1PUCCH-AN* in *SPS-config.* |
| ***subslotLengthForPUCCH***  Indicate the sub-slot length for sub-slot based PUCCH feedback in number of symbols (see TS 38.213 [13], clause 9). Value *n2* corresponds to 2 symbols, value *n6* corresponding to 6 symbols, value *n7* corresponds to 7 symbols. For normal CP, the value is either *n2* or *n7*. For extended CP, the value is either *n2* or *n6*. |
| ***ul-AccessConfigListDCI-1-1***  List of the combinations of cyclic prefix extension and UL channel access type (See TS 38.212 [17], Clause 7.3.1). The field *ul-AccessConfigListDCI-1-1-r17* indicates a list which only contains UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.2.2-6A). |

|  |
| --- |
| ***PUCCH-format3* field descriptions** |
| ***nrofPRBs***  The supported values are 1,2,3,4,5,6,8,9,10,12,15 and 16. The UE shall ignore this field when *formatExt* is configured. |

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

|  |
| --- |
| ***PUCCH-Resource, PUCCH-ResourceExt* field descriptions** |
| ***format,*** ***formatExt***  Selection of the PUCCH format (format 0 – 4) and format-specific parameters, see TS 38.213 [13], clause 9.2. *format0* and *format1* are only allowed for a resource in a first PUCCH resource set. *format2*, *format3* and *format4* are only allowed for a resource in non-first PUCCH resource set. The network can only configure *formatExt-v1610* when format is set to *format2* or *format3*. The network only configures *formatExt-v17xx* when format is set to *format0*, *format1* or *format4*. |
| ***interlace0***  This is the only interlace of interlaced PUCCH Format 0 and 1 and the first interlace for interlaced PUCCH Format 2 and 3. |
| ***interlace1***  A second interlace, in addition to interlace 0, as specified in TS 38.213 [13], clause 9.2.1. For 15KHz SCS, values {0..9} are applicable; for 30Khz SCS, values {0..4} are applicable. For 15kHz SCS, the values of *interlace1* shall satisfy *interlace1*=mod(*interlace0*+X,10) where X=1, -1, or 5. |
| ***intraSlotFrequencyHopping***  Enabling intra-slot frequency hopping, applicable for all types of PUCCH formats. For long PUCCH over multiple slots, the intra and inter slot frequency hopping cannot be enabled at the same time for a UE. See TS 38.213 [13], clause 9.2.1. |
| ***nrofPRBs***  Indicates the number of PRBs used per PUCCH resource for the PUCCH format, see TS 38.213 [13], clause 9.2.1. This field is applicable for PUCCH *format0*, *format1*, and *format4* in FR2-2. The supported values for *format4* are 1,2,3,4,5,6,8,9,10,12,15 and 16. |
| ***occ-Index***  Indicates the orthogonal cover code index (see TS 38.213 [13], clause 9.2.1). This field is Applicable when *useInterlacePUCCH-Dedicated-r16* is configured. |
| ***occ-Length***  Indicates the orthogonal cover code length (see TS 38.213 [13], clause 9.2.1). Applicable when *useInterlacePUCCH-Dedicated-r16* is configured. |
| ***pucch-ResourceId***  Identifier of the PUCCH resource. |
| ***secondHopPRB***  Index of first PRB after frequency hopping of PUCCH. This value is applicable for intra-slot frequency hopping (see TS 38.213 [13], clause 9.2.1) or inter-slot frequency hopping (see TS 38.213 [13], clause 9.2.6). |

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

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

– *PUCCH-ConfigCommon*

The IE *PUCCH-ConfigCommon* is used to configure the cell specific PUCCH parameters.

***PUCCH-ConfigCommon* information element**

-- ASN1START

-- TAG-PUCCH-CONFIGCOMMON-START

PUCCH-ConfigCommon ::= SEQUENCE {

pucch-ResourceCommon INTEGER (0..15) OPTIONAL, -- Cond InitialBWP-Only

pucch-GroupHopping ENUMERATED { neither, enable, disable },

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

p0-nominal INTEGER (-202..24) OPTIONAL, -- Need R

...,

[[

nrofPRBs INTEGER (1..16) OPTIONAL -- Need R

]]

}

-- TAG-PUCCH-CONFIGCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| ***PUCCH-ConfigCommon* field descriptions** |
| ***hoppingId***  Cell-specific scrambling ID for group hopping and sequence hopping if enabled, see TS 38.211 [16], clause 6.3.2.2. |
| ***nrofPRBs***  Indicates the number of PRBs used per PUCCH resource for PUCCH format 0 and format 1 in FR2-2, see TS 38.213 [13], clause 9.2.1. |
| ***p0-nominal***  Power control parameter P0 for PUCCH transmissions. Value in dBm. Only even values (step size 2) allowed (see TS 38.213 [13], clause 7.2). |
| ***pucch-GroupHopping***  Configuration of group- and sequence hopping for all the PUCCH formats 0, 1, 3 and 4. Value *neither* implies neither group or sequence hopping is enabled. Value *enable* enables group hopping and disables sequence hopping. Value *disable* disables group hopping and enables sequence hopping (see TS 38.211 [16], clause 6.3.2.2). |
| ***pucch-ResourceCommon***  An entry into a 16-row table where each row configures a set of cell-specific PUCCH resources/parameters. The UE uses those PUCCH resources until it is provided with a dedicated *PUCCH-Config* (e.g. during initial access) on the initial uplink BWP. Once the network provides a dedicated *PUCCH-Config* for that bandwidth part the UE applies that one instead of the one provided in this field (see TS 38.213 [13], clause 9.2). |

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| --- | --- |
| **Conditional Presence** | **Explanation** |
| *InitialBWP-Only* | The field is mandatory present in the *PUCCH-ConfigCommon* of the initial BWP (BWP#0) in SIB1. It is absent in other BWPs. |

< Unmodified parts omitted >

– *PUSCH-Config*

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

***PUSCH-Config* information element**

-- ASN1START

-- TAG-PUSCH-CONFIG-START

PUSCH-Config ::= SEQUENCE {

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

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

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

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

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

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

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

OPTIONAL, -- Need M

resourceAllocation ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},

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

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

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

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

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

codebookSubset ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent,nonCoherent}

OPTIONAL, -- Cond codebookBased

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

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

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

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

...,

[[

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

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

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

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

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

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

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

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

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

frequencyHoppingDCI-0-2-r16 CHOICE {

pusch-RepTypeA ENUMERATED {intraSlot, interSlot},

pusch-RepTypeB ENUMERATED {interRepetition, interSlot}

} OPTIONAL, -- Need S

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

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

OPTIONAL, -- Cond codebookBased

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

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

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

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

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

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

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

OPTIONAL, -- Need M

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

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

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

OPTIONAL, -- Need M

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

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

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

OPTIONAL, -- Need M

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

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

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

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

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

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

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

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

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

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

OPTIONAL, -- Need M

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

]],

[[

pusch-TimeDomainAllocationListForMultiPUSCH-r17 SetupRelease { PUSCH-TimeDomainResourceAllocationList-r17 }

OPTIONAL, -- Need M

pusch-TimeDomainAllocationListDCI-0-2-r17 SetupRelease { PUSCH-TimeDomainResourceAllocationList-r17 }

OPTIONAL, -- Need M

pusch-TimeDomainAllocationListDCI-0-1-r17 SetupRelease { PUSCH-TimeDomainResourceAllocationList-r17 }

OPTIONAL, -- Need M

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

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

]]

}

UCI-OnPUSCH ::= SEQUENCE {

betaOffsets CHOICE {

dynamic SEQUENCE (SIZE (4)) OF BetaOffsets,

semiStatic BetaOffsets

} OPTIONAL, -- Need M

scaling ENUMERATED { f0p5, f0p65, f0p8, f1 }

}

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

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

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

betaOffsetsDCI-0-2-r16 CHOICE {

dynamicDCI-0-2-r16 CHOICE {

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

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

},

semiStaticDCI-0-2-r16 BetaOffsets

} OPTIONAL, -- Need M

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

}

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

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

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

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

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

-- TAG-PUSCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***PUSCH-Config* field descriptions** |
| ***antennaPortsFieldPresenceDCI-0-2***  Configure the presence of “Antenna ports” field in DCI format 0\_2. When the field is configured, then the “Antenna ports” field is present in DCI format 0\_2. Otherwise, the field size is set to 0 for DCI format 0\_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* nor *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* is configured, this field is absent. |
| ***codebookSubset, codebookSubsetDCI-0-2***  Subset of PMIs addressed by TPMI, where PMIs are those supported by Ues with maximum coherence capabilities (see TS 38.214 [19], clause 6.1.1.1). The field *codebookSubset* applies to DCI format 0\_1 and the field *codebookSubsetDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.1.1). |
| ***dataScramblingIdentityPUSCH***  Identifier used to initalite data scrambling (c\_init) for PUSCH. If the field is absent, the UE applies the physical cell ID. (see TS 38.211 [16], clause 6.3.1.1). |
| ***dmrs-SequenceInitializationDCI-0-2***  Configure whether the field “DMRS Sequence Initialization” is present or not in DCI format 0\_2. If the field is absent, then 0 bit for the field “DMRS Sequence Initialization” in DCI format 0\_2. If the field is present, then the number of bits is determined in the same way as DCI format 0\_1 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-UplinkForPUSCH-MappingTypeA, dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2***  DMRS configuration for PUSCH transmissions using PUSCH mapping type A (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeA* applies to DCI format 0\_1 and the field *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***dmrs-UplinkForPUSCH-MappingTypeB, dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2***  DMRS configuration for PUSCH transmissions using PUSCH mapping type B (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeB* applies to DCI format 0\_1 and the field *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***frequencyHopping***  The value *intraSlot* enables ‘Intra-slot frequency hopping’ and the value *interSlot* enables ‘Inter-slot frequency hopping’. If the field is absent, frequency hopping is not configured for ‘pusch-RepTypeA’ (see TS 38.214 [19], clause 6.3). The field *frequencyHopping* applies to DCI format 0\_0 and 0\_1 for ‘pusch-RepTypeA’. |
| ***frequencyHoppingDCI-0-1***  Indicates the frequency hopping scheme for DCI format 0\_1 when *pusch-RepTypeIndicatorDCI-0-1* is set to ‘pusch-RepTypeB’, The value *interRepetition* enables ‘Inter-repetition frequency hopping’, and the value *interSlot* enables ‘Inter-slot frequency hopping’. If the field is absent, frequency hopping is not configured for DCI format 0\_1 (see TS 38.214 [19], clause 6.1). |
| ***frequencyHoppingDCI-0-2***  Indicate the frequency hopping scheme for DCI format 0\_2. The value *intraSlot* enables ‘intra-slot frequency hopping’, and the value *interRepetition* enables ‘Inter-repetition frequency hopping’, and the value *interSlot* enables ‘Inter-slot frequency hopping’. When *pusch-RepTypeIndicatorDCI-0-2* is set to ‘*pusch-RepTypeA*’, the frequency hopping scheme can be chosen between ‘intra-slot frequency hopping and ‘inter-slot frequency hopping’ if enabled. When *pusch-RepTypeIndicatorDCI-0-2* is set to ‘*pusch-RepTypeB’*, the frequency hopping scheme can be chosen between ‘inter-repetition frequency hopping’ and ‘inter-slot frequency hopping’ if enabled. If the field is absent, frequency hopping is not configured for DCI format 0\_2 for ‘pusch-RepTypeB’ (see TS 38.214 [19], clause 6.3). |
| ***frequencyHoppingOffsetLists, frequencyHoppingOffsetListsDCI-0-2***  Set of frequency hopping offsets used when frequency hopping is enabled for granted transmission (not msg3) and type 2 configured grant activation (see TS 38.214 [19], clause 6.3). The field *frequencyHoppingOffsetLists* applies to DCI format 0\_0 and DCI format 0\_1 and the field *frequencyHoppingOffsetListsDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.3). |
| ***harq-ProcessNumberSizeDCI-0-2***  Configure the number of bits for the field “HARQ process number” in DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***invalidSymbolPattern***  Indicates one pattern for invalid symbols for PUSCH transmission repetition type B applicable to both DCI format 0\_1 and 0\_2. If *InvalidSymbolPattern* is not configured, semi-static flexible symbols are used for PUSCH. Segmentation occurs only around semi-static DL symbols (see TS 38.214 [19] clause 6.1). |
| ***invalidSymbolPatternIndicatorDCI-0-1, invalidSymbolPatternIndicatorDCI-0-2***  Indicates the presence of an additional bit in the DCI format 0\_1/0\_2. If *invalidSymbolPattern* is absent, then both *invalidSymbolPatternIndicatorDCI-0-1* and *invalidSymbolPatternIndicatorDCI-0-2* are absent. The field *invalidSymbolPatternIndicatorDCI-0-1* applies to the DCI format 0\_1 and the field *invalidSymbolPatternIndicatorDCI-0-1* applies to DCI format 0\_2 (see TS 38.214 [19] clause 6.1). |
| ***maxRank, maxRankDCI-0-2***  Subset of PMIs addressed by TRIs from 1 to UlmaxRank (see TS 38.214 [19], clause 6.1.1.1). The field *maxRank* applies to DCI format 0\_1 and the field *maxRankDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.1.1). |
| ***mcs-Table, mcs-TableFormat0-2***  Indicates which MCS table the UE shall use for PUSCH without transform precoder (see TS 38.214 [19], clause 6.1.4.1). If the field is absent the UE applies the value 64QAM. The field *mcs-Table* applies to DCI format 0\_0 and DCI format 0\_1 and the field *mcs-TableDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.4.1). |
| ***mcs-TableTransformPrecoder, mcs-TableTransformPrecoderDCI-0-2***  Indicates which MCS table the UE shall use for PUSCH with transform precoding (see TS 38.214 [19], clause 6.1.4.1) If the field is absent the UE applies the value 64QAM. The field *mcs-TableTransformPrecoder* applies to DCI format 0\_0 and DCI format 0\_1 and the field *mcs-TableTransformPrecoderDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.4.1). |
| ***minimumSchedulingOffsetK2***  List of minimum K2 values. Minimum K2 parameter denotes minimum applicable value(s) for the *Time domain resource assignment* table for PUSCH (see TS 38.214 [19], clause 6.1.2.1). |
| ***numberOfBitsRV-DCI-0-2***  Configures the number of bits for “Redundancy version” in the DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1). |
| ***numberOfInvalidSymbolsForDL-UL-Switching***  Indicates the number of symbols after the last semi-static DL symbol that are invalid symbols for PUSCH repetition Type B. If it is absent, no symbol is explicitly defined for DL-to-UL switching (see TS 38.214 [19], clause 6.1). |
| ***priorityIndicatorDCI-0-1, priorityIndicatorDCI-0-2***  Configures the presence of “priority indicator” in DCI format 0\_1/0\_2. When the field is absent in the IE, then the UE shall apply 0 bit for “Priority indicator” in DCI format 0\_1/0\_2. The field *priorityIndicatorDCI-0-1* applies to DCI format 0\_1 and the field *priorityIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13] clause 9). |
| ***Pusch-AggregationFactor***  Number of repetitions for data (see TS 38.214 [19], clause 6.1.2.1). If the field is absent the UE applies the value 1. |
| ***Pusch-RepTypeIndicatorDCI-0-1, pusch-RepTypeIndicatorDCI-0-2***  Indicates whether UE follows the behavior for “PUSCH repetition type A” or the behavior for “PUSCH repetition type B” for the PUSCH scheduled by DCI format 0\_1/0\_2 and for Type 2 CG associated with the activating DCI format 0\_1/0\_2.The value *pusch-RepTypeA* enables the ‘PUSCH repetition type A’ and the value *pusch-RepTypeB* enables the ‘PUSCH repetition type B’. The field *pusch-RepTypeIndicatorDCI-0-1* applies to DCI format 0\_1 and the field *pusch-RepTypeIndicatorDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***pusch-TimeDomainAllocationList***  List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1). The field *pusch-TimeDomainAllocationList* applies to DCI formats 0\_0 or DCI format 0\_1 when the field *pusch-TimeDomainAllocationListDCI-0-1* is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and table 6.1.2.1.1-1A). The network does not configure the *pusch-TimeDomainAllocationList* (without suffix) simultaneously with the *pusch-TimeDomainAllocationListDCI-0-2-r16* or *pusch-TimeDomainAllocationListDCI-0-1-r16* or *pusch-TimeDomainAllocationListForMultiPUSCH-r16*. |
| ***Pusch-TimeDomainAllocationListDCI-0-1***  Configuration of the time domain resource allocation (TDRA) table for DCI format 0\_1 (see TS 38.214 [19], clause 6.1, table 6.1.2.1.1-1A). |
| ***pusch-TimeDomainAllocationListDCI-0-2***  Configuration of the time domain resource allocation (TDRA) table for DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2, table 6.1.2.1.1-1B). |
| ***pusch-TimeDomainAllocationListForMultiPUSCH***  Configuration of the time domain resource allocation (TDRA) table for multiple PUSCH (see TS 38.214 [19], clause 6.1.2). The field *pusch-TimeDomainAllocationListForMultiPUSCH-r17* is applicable for PUSCH SCS of 120 kHz, 480 and 960 kHz. The network configures at most 16 rows in this TDRA table in *PUSCH-TimeDomainResourceAllocationList-r16* configured by this field and at most 16 rows in *PUSCH-TimeDomainResourceAllocationList-r17*. This field is not configured simultaneously with *pusch-AggregationFactor*. |
| ***Rbg-Size***  Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1). |
| ***resourceAllocation, resourceAllocationDCI-0-2***  Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 6.1.2). The field *resourceAllocation* applies to DCI format 0\_1 and the field *resourceAllocationDCI-0-2* applies to DCI format 0\_2 (see TS 38.214 [19], clause 6.1.2). |
| ***resourceAllocationType1GranularityDCI-0-2***  Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0\_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2). |
| ***tp-pi2BPSK***  Enables pi/2-BPSK modulation with transform precoding if the field is present and disables it otherwise. |
| ***transformPrecoder***  The UE specific selection of transformer precoder for PUSCH (see TS 38.214 [19], clause 6.1.3). When the field is absent the UE applies the value of the field *msg3-transformPrecoder*. |
| ***txConfig***  Whether UE uses codebook based or non-codebook based transmission (see TS 38.214 [19], clause 6.1.1). If the field is absent, the UE transmits PUSCH on one antenna port, see TS 38.214 [19], clause 6.1.1. |
| ***uci-OnPUSCH-ListDCI-0-1, uci-OnPUSCH-ListDCI-0-2***  Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0\_1/0\_2. The field uci-OnPUSCH-ListDCI-0-1 applies to DCI format 0\_1 and the field uci-OnPUSCH-ListDCI-0-2 applies to DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3). |
| ***ul-AccessConfigListDCI-0-1***  List of the combinations of cyclic prefix extension, channel access priority class (CAPC), and UL channel access type (see TS 38.212 [17], Table 7.3.1.1.2-35).The field *ul-AccessConfigListDCI-0-1-r17* only contains a list of UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.1.2-35A). |
| ***ul-FullPowerTransmission***  Configures the UE with UL full power transmission mode as specified in TS 38.213. |

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

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

|  |  |
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| **Conditional Presence** | **Explanation** |
| *codebookBased* | The field is mandatory present if *txConfig* is set to codebook and absent otherwise. |
| *RepTypeB* | The field is optionally present, Need S, if *pusch-RepTypeIndicatorDCI-0-1* is set to pusch-RepTypeB. It is absent otherwise. |
| *RepTypeB2* | The field is optionally present, Need S, if *pusch-RepTypeIndicatorDCI-0-1* or *pusch-RepTypeIndicatorDCI-0-2* is set to pusch-RepTypeB. It is absent otherwise. |

< Unmodified parts omitted >

– *PUSCH-TimeDomainResourceAllocationList*

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

***PUSCH-TimeDomainResourceAllocation* information element**

-- ASN1START

-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-START

PUSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations)) OF PUSCH-TimeDomainResourceAllocation

PUSCH-TimeDomainResourceAllocation ::= SEQUENCE {

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

mappingType ENUMERATED {typeA, typeB},

startSymbolAndLength INTEGER (0..127)

}

PUSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocation-r16

PUSCH-TimeDomainResourceAllocation-r16 ::= SEQUENCE {

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

puschAllocationList-r16 SEQUENCE (SIZE(1..maxNrofMultiplePUSCHs-r16)) OF PUSCH-Allocation-r16,

...

}

PUSCH-Allocation-r16 ::= SEQUENCE {

mappingType-r16 ENUMERATED {typeA, typeB} OPTIONAL, -- Cond NotFormat01-02-Or-TypeA

startSymbolAndLength-r16 INTEGER (0..127) OPTIONAL, -- Cond NotFormat01-02-Or-TypeA

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

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

numberOfRepetitions-r16 ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16} OPTIONAL, -- Cond Format01-02

...

}

PUSCH-TimeDomainResourceAllocationList-r17 ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocation-r17

PUSCH-TimeDomainResourceAllocation-r17 ::= SEQUENCE {

pusch-AllocationList-r17 SEQUENCE (SIZE(1..maxNrofMultiplePUSCHs-r16)) OF PUSCH-Allocation-r17,

...

}

PUSCH-Allocation-r17 ::= SEQUENCE {

k2-r17 INTEGER (0..128) OPTIONAL, -- Cond MultiPUSCH

pusch-Allocation-r17 PUSCH-Allocation-r16

}

-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP

-- ASN1STOP

|  |
| --- |
| ***PUSCH-TimeDomainResourceAllocationList* field descriptions** |
| ***k2***  Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1). For k2-r17, only values {0..32} are applicable for PUSCH SCS of 120 kHz.  When the field is absent for the first PUSCH if multiple PUSCH are configured per PDCCH, or when the field is absent and only one PUSCH is configured per PDCCH, the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, the value 3 when PUSCH SCS is 120 kHz, the value 11 when PUSCH SCS is 480 kHz, and the value 21 when PUSCH SCS is 960 kHz. |
| ***length***  Indicates the length allocated for PUSCH for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***mappingType***  Mapping type (see TS 38.214 [19], clause 6.1.2.1). |
| ***numberOfRepetitions***  Number of repetitions for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***puschAllocationList***  The field *puschAllocationList-r16* indicates one or multiple PUSCH continuous in time domain which share a common *k2* (see TS 38.214 [19], clause 6.1.2.1). The field *pusch-AllocationList-r17* configures one or multiple PUSCH that may be in consecutive or non-consecutive slots (see TS 38.214 [19], clause 6.1.2.1). The *puschAllocationList-r16* only has one element in *pusch-TimeDomainAllocationListDCI-0-1-r16* and in *pusch-TimeDomainAllocationListDCI-0-2-*r16. The *puschAllocationList-r17* only has one element in *pusch-TimeDomainAllocationListDCI-0-1-r17* and in *pusch-TimeDomainAllocationListDCI-0-2-*r17. |
| ***startSymbol***  Indicates the index of start symbol for PUSCH for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***startSymbolAndLength***  An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV). The network configures the field so that the allocation does not cross the slot boundary. (see TS 38.214 [19], clause 6.1.2.1). |

|  |  |
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| **Conditional Presence** | **Explanation** |
| *Format01-02* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r16 and pusch-TimeDomainAllocationListForMultiPUSCH-r17*, the field is absent.  In *pusch-TimeDomainAllocationListDCI-0-1* and in *pusch-TimeDomainAllocationListDCI-0-2*,the field is mandatory present. |
| *NotFormat01-02-Or-TypeA* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r16 and pusch-TimeDomainAllocationListForMultiPUSCH-r17*, the field is mandatory present.  In *pusch-TimeDomainAllocationListDCI-0-1,* the field is optionally present if *pusch-RepTypeIndicatorDCI-0-1* is set to pusch-RepTypeA, Need R. It is absent otherwise, Need R.  In *pusch-TimeDomainAllocationListDCI-0-2,* the field is optionally present if *pusch-RepTypeIndicatorDCI-0-2* is set to pusch-RepTypeA, Need R. It is absent otherwise, Need R. |
| *RepTypeB* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r16 and pusch-TimeDomainAllocationListForMultiPUSCH-r17*, the field is absent.  In *pusch-TimeDomainAllocationListDCI-0-1,* the field is optionally present if *pusch-RepTypeIndicatorDCI-0-1* is set to pusch-RepTypeB, Need R. It is absent otherwise, Need R.  In *pusch-TimeDomainAllocationListDCI-0-2,* the field is optionally present if *pusch-RepTypeIndicatorDCI-0-2* is set to pusch-RepTypeB, Need R. It is absent otherwise, Need R. |
| *MultiPUSCH* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r17*, the field k2(n) corresponding to k2 of the n-th PUSCH, n>1, is mandatory present. Otherwise, it is optionally present, Need S. |

< Unmodified parts omitted >

– *RACH-ConfigCommon*

The IE *RACH-ConfigCommon* is used to specify the cell specific random-access parameters.

***RACH-ConfigCommon* information element**

-- ASN1START

-- TAG-RACH-CONFIGCOMMON-START

RACH-ConfigCommon ::= SEQUENCE {

rach-ConfigGeneric RACH-ConfigGeneric,

totalNumberOfRA-Preambles INTEGER (1..63) OPTIONAL, -- Need S

ssb-perRACH-OccasionAndCB-PreamblesPerSSB CHOICE {

oneEighth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

oneFourth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

oneHalf ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

one ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

two ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},

four INTEGER (1..16),

eight INTEGER (1..8),

sixteen INTEGER (1..4)

} OPTIONAL, -- Need M

groupBconfigured SEQUENCE {

ra-Msg3SizeGroupA ENUMERATED {b56, b144, b208, b256, b282, b480, b640,

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

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

numberOfRA-PreamblesGroupA INTEGER (1..64)

} OPTIONAL, -- Need R

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

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

rsrp-ThresholdSSB-SUL RSRP-Range OPTIONAL, -- Cond SUL

prach-RootSequenceIndex CHOICE {

l839 INTEGER (0..837),

l139 INTEGER (0..137)

},

msg1-SubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond L139

restrictedSetConfig ENUMERATED {unrestrictedSet, restrictedSetTypeA, restrictedSetTypeB},

msg3-transformPrecoder ENUMERATED {enabled} OPTIONAL, -- Need R

...,

[[

ra-PrioritizationForAccessIdentity-r16 SEQUENCE {

ra-Prioritization-r16 RA-Prioritization,

ra-PrioritizationForAI-r16 BIT STRING (SIZE (2))

} OPTIONAL, -- Cond InitialBWP-Only

prach-RootSequenceIndex-r16 CHOICE {

l571 INTEGER (0..569),

l1151 INTEGER (0..1149)

} OPTIONAL -- Need R

]]

}

-- TAG-RACH-CONFIGCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| ***RACH-ConfigCommon* field descriptions** |
| ***messagePowerOffsetGroupB***  Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.2) |
| ***msg1-SubcarrierSpacing***  Subcarrier spacing of PRACH (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]). The value also applies to contention free random access (*RACH-ConfigDedicated*), to SI-request and to contention-based beam failure recovery (CB-BFR). But it does not apply for contention free beam failure recovery (CF-BFR) (see *BeamFailureRecoveryConfig*). |
| ***msg3-transformPrecoder***  Enables the transform precoder for Msg3 transmission according to clause 6.1.3 of TS 38.214 [19]. If the field is absent, the UE disables the transformer precoder (see TS 38.213 [13], clause 8.3). |
| ***numberOfRA-PreamblesGroupA***  The number of CB preambles per SSB in group A. This determines implicitly the number of CB preambles per SSB available in group B. (see TS 38.321 [3], clause 5.1.1). The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*. |
| ***prach-RootSequenceIndex***  PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1). The value range depends on whether L=839 or L=139 or L=571 or L=1151. The length of the root sequence corresponding with the index indicated in this IE should be consistent with the one indicated in *prach-ConfigurationIndex* in the *RACH-ConfigDedicated* (if configured). If *prach-RootSequenceIndex-r16* is signalled, UE shall ignore the *prach-RootSequenceIndex* (without suffix).  For FR2-2, only the following values are applicable depending on the used subcarrier spacing:  120 kHz: L=139, L=571, and L=1151  480 kHz: L=139, and L=571  960 kHz: L=139 |
| ***ra-ContentionResolutionTimer***  The initial value for the contention resolution timer (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on. |
| ***ra-Msg3SizeGroupA***  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). |
| ***ra-Prioritization***  Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a). |
| ***ra-PrioritizationForAI***  Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value 1 indicates that the field *ra-Prioritization-r16* applies otherwise the field does not apply (see TS 23.501 [32]). |
| ***rach-ConfigGeneric***  RACH parameters for both regular random access and beam failure recovery. |
| ***restrictedSetConfig***  Configuration of an unrestricted set or one of two types of restricted sets, see TS 38.211 [16], clause 6.3.3.1. |
| ***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]). |
| ***rsrp-ThresholdSSB-SUL***  The UE selects SUL carrier to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). The value applies to all the BWPs. |
| ***ssb-perRACH-OccasionAndCB-PreamblesPerSSB***  The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEighth* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* \* max(1, *SSB-per-rach-occasion*). See TS 38.213 [13]. |
| ***totalNumberOfRA-Preambles***  Total number of preambles used for contention based and contention free 4-step or 2-step random access in the RACH resources defined in *RACH-ConfigCommon*, excluding preambles used for other purposes (e.g. for SI request). If the field is absent, all 64 preambles are available for RA. The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*, i.e. it should be a multiple of the number of SSBs per RACH occasion. |

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| **Conditional Presence** | **Explanation** |
| *L139* | The field is mandatory present if *prach-RootSequenceIndex* L=139, otherwise the field is absent, Need S. |
| *SUL* | The field is mandatory present in *initialUplinkBWP* if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB* or if *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon*; otherwise, the field is absent. |
| *InitialBWP-Only* | This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise the field is absent. |

– *RACH-ConfigCommonTwoStepRA*

The IE *RACH-ConfigCommonTwoStepRA* is used to specify cell specific 2-step random-access type parameters.

***RACH-ConfigCommonTwoStepRA* information element**

-- ASN1START

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-START

RACH-ConfigCommonTwoStepRA-r16 ::= SEQUENCE {

rach-ConfigGenericTwoStepRA-r16 RACH-ConfigGenericTwoStepRA-r16,

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

msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB-r16 CHOICE {

oneEighth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

oneFourth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

oneHalf ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

one ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

two ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},

four INTEGER (1..16),

eight INTEGER (1..8),

sixteen INTEGER (1..4)

} OPTIONAL, -- Cond 2StepOnly

msgA-CB-PreamblesPerSSB-PerSharedRO-r16 INTEGER (1..60) OPTIONAL, -- Cond SharedRO

msgA-SSB-SharedRO-MaskIndex-r16 INTEGER (1..15) OPTIONAL, -- Need S

groupB-ConfiguredTwoStepRA-r16 GroupB-ConfiguredTwoStepRA-r16 OPTIONAL, -- Need S

msgA-PRACH-RootSequenceIndex-r16 CHOICE {

l839 INTEGER (0..837),

l139 INTEGER (0..137),

l571 INTEGER (0..569),

l1151 INTEGER (0..1149)

} OPTIONAL, -- Cond 2StepOnly

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

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

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

msgA-SubcarrierSpacing-r16 SubcarrierSpacing OPTIONAL, -- Cond 2StepOnlyL139

msgA-RestrictedSetConfig-r16 ENUMERATED {unrestrictedSet, restrictedSetTypeA,

restrictedSetTypeB} OPTIONAL, -- Cond 2StepOnly

ra-PrioritizationForAccessIdentityTwoStep-r16 SEQUENCE {

ra-Prioritization-r16 RA-Prioritization,

ra-PrioritizationForAI-r16 BIT STRING (SIZE (2))

} OPTIONAL, -- Cond InitialBWP-Only

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

...

}

GroupB-ConfiguredTwoStepRA-r16 ::= SEQUENCE {

ra-MsgA-SizeGroupA ENUMERATED {b56, b144, b208, b256, b282, b480, b640, b800,

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

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

numberOfRA-PreamblesGroupA INTEGER (1..64)

}

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-STOP

-- ASN1STOP

|  |
| --- |
| ***RACH-ConfigCommonTwoStepRA* field descriptions** |
| ***groupB-ConfiguredTwoStepRA***  Preamble grouping for 2-step random access type. If the field is absent then there is only one preamble group configured and only one msgA PUSCH configuration. |
| ***msgA-CB-PreamblesPerSSB-PerSharedRO***  Number of contention-based preambles used for 2-step RA type from the non-CBRA 4-step type preambles associated with each SSB for RO shared with 4-step type RA. The number of preambles for 2-step RA type shall not exceed the number of preambles per SSB minus the number of contention-based preambles per SSB for 4-step type RA. The possible value range for this parameter needs to be aligned with value range for the configured SSBs per RACH occasion in *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. The field is only applicable for the case of shared ROs with 4-step type random access. |
| ***msgA-PRACH-RootSequenceIndex***  PRACH root sequence index. If the field is not configured, the UE applies the value in field *prach-RootSequenceIndex* in *RACH-ConfigCommon* in the configured BWP. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access.  For FR2-2, only the following values are applicable depending on the used subcarrier spacing:  120 kHz: L=139, L=571, and L=1151  480 kHz: L=139, and L=571  960 kHz: L=139 |
| ***msgA-RestrictedSetConfig***  Configuration of an unrestricted set or one of two types of restricted sets for 2-step random access type preamble. If the field is not configured, the UE applies the value in field *restrictedSetConfig* in *RACH-ConfigCommon* in the configured BWP. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access. |
| ***msgA-RSRP-Threshold***  The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the BWP. |
| ***msgA-RSRP-ThresholdSSB***  UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]). |
| ***msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB***  The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEight* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* \* max(1, *SSB-per-rach-occasion*). If the field is not configured and both 2-step and 4-step are configured for the BWP, the UE applies the value in the field *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. The field is not present when RACH occasions are shared between 2-step and 4-step type random access in the BWP. |
| ***msgA-SSB-SharedRO-MaskIndex***  Indicates the subset of 4-step type ROs shared with 2-step random access type for each SSB. This field is configured when there is more than one RO per SSB. If the field is absent, and 4-step and 2-step has shared ROs, then all ROs are shared. |
| ***msgA-SubcarrierSpacing***  Subcarrier spacing of PRACH (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 the field is absent, the UE applies the SCS as derived from the *msgA-PRACH-ConfigurationIndex* in *RACH-ConfigGenericTwoStepRA* (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]) in case of 2-step only BWP, otherwise the UE applies the same SCS as Msg1 derived from *RACH-ConfigCommon*. The value also applies to contention free 2-step random access type (*RACH-ConfigDedicated*). |
| ***msgA-TotalNumberOfRA-Preambles***  Indicates the total number of preambles used for contention-based and contention-free 2-step random access type when ROs for 2-step are not shared with 4-step. If the field is absent, and 2-step and 4-step does not have shared ROs, all 64 preambles are available for 2-step random access type. |
| ***msgA-TransMax***  Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). This field is only applicable when 2-step and 4-step RA type are configured and switching to 4-step type RA is supported. If the field is absent, switching from 2-step RA type to 4-step RA type is not allowed. |
| ***ra-ContentionResolutionTimer***  The initial value for the contention resolution timer for fallback RAR in case no 4-step random access type is configured (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on. If both 2-step and 4-step random access type resources are configured on the BWP, then this field is absent. |
| ***ra-Prioritization***  Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a). |
| ***ra-PrioritizationForAI***  Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value *1* for an Access Identity indicates that the field *ra-Prioritization-r16* applies, otherwise the field does not apply. |
| ***rach-ConfigGenericTwoStepRA***  2-step random access type parameters for both regular random access and beam failure recovery. |

|  |
| --- |
| ***GroupB-ConfiguredTwoStepRA* field descriptions** |
| ***messagePowerOffsetGroupB***  Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.1). |
| ***numberOfRA-PreamblesGroupA***  The number of CB preambles per SSB in group A for idle/inactive or connected mode. The setting of the number of preambles for each group should be consistent with *msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB* or *msgA-CB-PreamblesPerSSB-PerSharedRO* if configured. |
| ***ra-MsgA-SizeGroupA***  Transport block size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.1). |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *2StepOnlyL139* | The field is mandatory present if *prach-RootSequenceIndex* L=139 and no 4-step random access type is configured, otherwise the field is absent, Need S. |
| *2StepOnly* | The field is mandatory present if there are no 4-step random access configurations configured in the BWP, i.e only 2-step random access type configured in the BWP, otherwise the field is optionally present, Need S. |
| *SharedRO* | The field is mandatory present if the 2-step random access type occasions are shared with 4-step random access type, otherwise the field is not present. |
| *2Step4Step* | The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP, otherwise the field is not present. |
| *InitialBWP-Only* | This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise the field is absent. |

< Unmodified parts omitted >

– *RACH-ConfigGeneric*

The IE *RACH-ConfigGeneric* is used to specify the random-access parameters both for regular random access as well as for beam failure recovery.

***RACH-ConfigGeneric* information element**

-- ASN1START

-- TAG-RACH-CONFIGGENERIC-START

RACH-ConfigGeneric ::= SEQUENCE {

prach-ConfigurationIndex INTEGER (0..255),

msg1-FDM ENUMERATED {one, two, four, eight},

msg1-FrequencyStart INTEGER (0..maxNrofPhysicalResourceBlocks-1),

zeroCorrelationZoneConfig INTEGER(0..15),

preambleReceivedTargetPower INTEGER (-202..-60),

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

powerRampingStep ENUMERATED {dB0, dB2, dB4, dB6},

ra-ResponseWindow ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80},

...,

[[

prach-ConfigurationPeriodScaling-IAB-r16 ENUMERATED {scf1,scf2,scf4,scf8,scf16,scf32,scf64} OPTIONAL, -- Need R

prach-ConfigurationFrameOffset-IAB-r16 INTEGER (0..63) OPTIONAL, -- Need R

prach-ConfigurationSOffset-IAB-r16 INTEGER (0..39) OPTIONAL, -- Need R

ra-ResponseWindow-v1610 ENUMERATED { sl60, sl160} OPTIONAL, -- Need R

prach-ConfigurationIndex-v1610 INTEGER (256..262) OPTIONAL -- Need R

]],

[[

ra-ResponseWindow-v17xy ENUMERATED {sl240, sl320, sl640, sl960, sl1280, sl1920, sl2560} OPTIONAL -- Need R

]]

}

-- TAG-RACH-CONFIGGENERIC-STOP

-- ASN1STOP

|  |
| --- |
| ***RACH-ConfigGeneric* field descriptions** |
| ***msg1-FDM***  The number of PRACH transmission occasions FDMed in one time instance. (see TS 38.211 [16], clause 6.3.3.2). |
| ***msg1-FrequencyStart***  Offset of lowest PRACH transmission occasion in frequency domain with respective to PRB 0. The value is configured so that the corresponding RACH resource is entirely within the bandwidth of the UL BWP. (see TS 38.211 [16], clause 6.3.3.2). |
| ***powerRampingStep***  Power ramping steps for PRACH (see TS 38.321 [3],5.1.3). |
| ***prach-ConfigurationFrameOffset-IAB***  Frame offset for ROs defined in the baseline configuration indicated by *prach-ConfigurationIndex* and is used only by the IAB-MT. (see TS 38.211 [16], clause 6.3.3.2). |
| ***prach-ConfigurationIndex***  PRACH configuration index. For *prach-ConfigurationIndex* configured under *beamFailureRecovery-Config*, the *prach-ConfigurationIndex* can only correspond to the short preamble format, (see TS 38.211 [16], clause 6.3.3.2). If the field *prach-ConfigurationIndex-v1610* is present, the UE shall ignore the value provided in *prach-ConfigurationIndex* (without suffix). |
| ***prach-ConfigurationPeriodScaling-IAB***  Scaling factor to extend the periodicity of the baseline configuration indicated by *prach-ConfigurationIndex* and is used only by the IAB-MT*.* Value scf1 corresponds to scaling factor of 1 and so on. (see TS 38.211 [16], clause 6.3.3.2). |
| ***prach-ConfigurationSOffset-IAB***  Subframe/Slot offset for ROs defined in the baseline configuration indicated by *prach-ConfigurationIndex* and is used only by the IAB-MT*.* (see TS 38.211 [16], clause 6.3.3.2). |
| ***preambleReceivedTargetPower***  The target power level at the network receiver side (see TS 38.213 [13], clause 7.4, TS 38.321 [3], clauses 5.1.2, 5.1.3). Only multiples of 2 dBm may be chosen (e.g. -202, -200, -198, ...). |
| ***preambleTransMax***  Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5). |
| ***ra-ResponseWindow***  Msg2 (RAR) window length in number of slots. The network configures a value lower than or equal to 10 ms when Msg2 is transmitted in licensed spectrum and a value lower than or equal to 40 ms when Msg2 is transmitted with shared spectrum channel access (see TS 38.321 [3], clause 5.1.4). UE ignores the field if included in *SCellConfig*. If *ra-ResponseWindow-v1610* or *ra-ResponseWindow-v17xy* is signalled, UE shall ignore the *ra-ResponseWindow* (without suffix). The field *ra-ResponseWindow-v17xy* is applicable to SCS 480 kHz and SCS 960 kHz. |
| ***zeroCorrelationZoneConfig***  N-CS configuration, see Table 6.3.3.1-5 in TS 38.211 [16]. |

– *RACH-ConfigGenericTwoStepRA*

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

***RACH-ConfigGenericTwoStepRA* information element**

-- ASN1START

-- TAG-RACH-CONFIGGENERICTWOSTEPRA-START

RACH-ConfigGenericTwoStepRA-r16 ::= SEQUENCE {

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

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

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

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

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

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

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

OPTIONAL, -- Cond NoCFRA

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

...,

[[

msgB-ResponseWindow-v17xy ENUMERATED {sl240, sl640, sl960, sl1280, sl1920, sl2560} OPTIONAL -- Cond NoCFRA2

]]

}

-- TAG-RACH-CONFIGGENERICTWOSTEPRA-STOP

-- ASN1STOP

|  |
| --- |
| ***RACH-ConfigGenericTwoStepRA* field descriptions** |
| ***msgA-PreamblePowerRampingStep***  Power ramping steps for msgA PRACH. If the field is absent, UE shall use the value of *powerRampingStep* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.321 [3], 5.1.3). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and thenthe UE uses the value of *msgA-PreamblePowerRampingStep* in *RACH-ConfigGenericTwoStepRA* configured forCBRA. |
| ***msgA-PreambleReceivedTargetPower***  The target power level at the network receiver side (see TS 38.213 [13], clause 7.1.1 and TS 38.321 [3], clause 5.1.1). Only multiples of 2 dBm may be chosen (e.g -202, -200, -198, …). If the field is absent, UE shall use the value of *preambleReceivedTargetPower* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and thenthe UE uses the value of *msgA-PreambleReceivedTargetPower*in *RACH-ConfigGenericTwoStepRA* configured forCBRA*.* |
| ***msgA-PRACH-ConfigurationIndex***  Cell-specific PRACH configuration index for 2-step RA type. If the field is absent the UE shall use the value of corresponding 4-step random access parameter in the configured BWP. If the value is in the range of 256 to 262, the field *prach-ConfigurationIndex-v1610* should be considered configured (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| ***msgA-RO-FDM***  The number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance. If the field is absent, UE shall use value of *msg1-FDM* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| ***msgA-RO-FrequencyStart***  Offset of lowest PRACH transmissions occasion in frequency domain with respect to PRB 0. If the field is absent, UE shall use value of *msg1-FrequencyStart* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.211 [16], clauses 5.3.2 and 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| ***msgA-ZeroCorrelationZoneConfig***  N-CS configuration for msgA preamble, see Table 6.3.3.1-5 in TS 38.211 [16]. If the field is absent, UE shall use value *zeroCorrelationZoneConfig* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. |
| ***msgB-ResponseWindow***  MsgB monitoring window length in number of slots. The network configures a value lower than or equal to 40ms (see TS 38.321 [3], clause 5.1.1). The network does not configure *msgB-ResponseWindow-r16* simultaneously with *msgB-ResponseWindow-v17xy*, and if both fields are absent,the UE uses the value of *msgB-ResponseWindow* in *RACH-ConfigGenericTwoStepRA* configured for CBRA. |
| ***preambleTransMax***  Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5). If the field is absent, UE shall use the value of *preambleTransMax* in *RACH-ConfigGeneric* in the configured BWP. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and thenthe UE uses the value of *preambleTransMax*in *RACH-ConfigGenericTwoStepRA* configured forCBRA*.* |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *2StepOnly* | The field is mandatory present if there are no 4-step random access configurations configured in the BWP, i.e only 2-step random access type configured in the BWP, otherwise the field is optionally present, Need S. |
| *2StepOnlyNoCFRA* | The field is mandatory present if *RACH-ConfigGenericTwoStepRA* is included in the *RACH-ConfigCommonTwoStepRA* and there are no 4-step random access configurations configured in the BWP (i.e only 2-step random access type configured in the BWP), otherwise (i.e. 4-step random access configuration also exists in the BWP) the field is optionally present, Need S. When *RACH-ConfigGenericTwoStepRA* is included in the *RACH-ConfigDedicated*, this field is absent. |
| *NoCFRA* | The field is mandatory present if *msgB-ResponseWindow-r17* is absent and *RACH-ConfigGenericTwoStepRA* is not included in *CFRA-TwoStep* in *RACH-ConfigDedicated,* otherwise the field is absent, Need S. |
| *NoCFRA2* | The field is mandatory present if *msgB-ResponseWindow-r16* is absent and *RACH-ConfigGenericTwoStepRA* is not included in *CFRA-TwoStep* in *RACH-ConfigDedicated,* otherwise the field is absent, Need S. |

< Unmodified parts omitted >

– *RateMatchPattern*

The IE *RateMatchPattern* is used to configure one rate matching pattern for PDSCH, see TS 38.214 [19], clause 5.1.4.1.

***RateMatchPattern* information element**

-- ASN1START

-- TAG-RATEMATCHPATTERN-START

RateMatchPattern ::= SEQUENCE {

rateMatchPatternId RateMatchPatternId,

patternType CHOICE {

bitmaps SEQUENCE {

resourceBlocks BIT STRING (SIZE (275)),

symbolsInResourceBlock CHOICE {

oneSlot BIT STRING (SIZE (14)),

twoSlots BIT STRING (SIZE (28))

},

periodicityAndPattern CHOICE {

n2 BIT STRING (SIZE (2)),

n4 BIT STRING (SIZE (4)),

n5 BIT STRING (SIZE (5)),

n8 BIT STRING (SIZE (8)),

n10 BIT STRING (SIZE (10)),

n20 BIT STRING (SIZE (20)),

n40 BIT STRING (SIZE (40))

} OPTIONAL, -- Need S

...

},

controlResourceSet ControlResourceSetId

},

subcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond CellLevel

dummy ENUMERATED { dynamic, semiStatic },

...,

[[

controlResourceSet-r16 ControlResourceSetId-r16 OPTIONAL -- Need R

]]

}

-- TAG-RATEMATCHPATTERN-STOP

-- ASN1STOP

|  |
| --- |
| ***RateMatchPattern* field descriptions** |
| ***bitmaps***  Indicates rate matching pattern by a pair of bitmaps *resourceBlocks* and *symbolsInResourceBlock* to define the rate match pattern within one or two slots, and a third bitmap *periodicityAndPattern* to define the repetition pattern with which the pattern defined by the above bitmap pair occurs. |
| ***controlResourceSet***  This ControlResourceSet is used as a PDSCH rate matching pattern, i.e., PDSCH reception rate matches around it. In frequency domain, the resource is determined by the frequency domain resource of the CORESET with the corresponding CORESET ID. Time domain resource is determined by the parameters of the associated search space of the CORESET.  If the field *controlResourceSetId-r16* is present, UE shall ignore the *controlResourceSetId* (without suffix). |
| ***periodicityAndPattern***  A time domain repetition pattern at which the pattern defined by *symbolsInResourceBlock* and *resourceBlocks* recurs. This slot pattern repeats itself continuously. Absence of this field indicates the value *n1* (see TS 38.214 [19], clause 5.1.4.1). |
| ***resourceBlocks***  A resource block level bitmap in the frequency domain. A bit in the bitmap set to 1 indicates that the UE shall apply rate matching in the corresponding resource block in accordance with the *symbolsInResourceBlock* bitmap. If used as cell-level rate matching pattern, the bitmap identifies "common resource blocks (CRB)". If used as BWP-level rate matching pattern, the bitmap identifies "physical resource blocks" inside the BWP. The first/ leftmost bit corresponds to resource block 0, and so on (see TS 38.214 [19], clause 5.1.4.1). |
| ***subcarrierSpacing***  The SubcarrierSpacing for this resource pattern. If the field is absent, the UE applies the SCS of the associated BWP. The value *kHz15* corresponds to µ=0, the value *kHz30* corresponds to µ=1, and so on  Only the following values are applicable depending on the used frequency (see TS 38.214 [19], clause 5.1.4.1):  FR1: 15, 30 or 60 kHz  FR2-1: 60 or 120 kHz  FR2-2: 120, 480, or 960 kHz |
| ***symbolsInResourceBlock***  A symbol level bitmap in time domain. It indicates with a bit set to true that the UE shall rate match around the corresponding symbol. This pattern recurs (in time domain) with the configured periodicityAndPattern (see TS 38.214 [19], clause 5.1.4.1).  For *oneSlot*, if ECP is configured, the first 12 bits represent the symbols within the slot and the last two bits within the bitstring are ignored by the UE; Otherwise, the 14 bits represent the symbols within the slot.  For *twoSlots*, if ECP is configured, the first 12 bits represent the symbols within the first slot and the next 12 bits represent the symbols in the second slot and the last four bits within the bit string are ignored by the UE; Otherwise, the first 14 bits represent the symbols within the first slot and the next 14 bits represent the symbols in the second slot.  For the bits representing symbols in a slot, the most significant bit of the bit string represents the first symbol in the slot and the second most significant bit represents the second symbol in the slot and so on. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *CellLevel* | The field is mandatory present if the *RateMatchPattern* is defined on cell level. The field is absent when the *RateMatchPattern* is defined on BWP level. If the *RateMatchPattern* is defined on BWP level, the UE applies the SCS of the BWP. |

< Unmodified parts omitted >

– *SchedulingRequestResourceConfig*

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

***SchedulingRequestResourceConfig* information element**

-- ASN1START

-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-START

SchedulingRequestResourceConfig ::= SEQUENCE {

schedulingRequestResourceId SchedulingRequestResourceId,

schedulingRequestID SchedulingRequestId,

periodicityAndOffset CHOICE {

sym2 NULL,

sym6or7 NULL,

sl1 NULL, -- Recurs in every slot

sl2 INTEGER (0..1),

sl4 INTEGER (0..3),

sl5 INTEGER (0..4),

sl8 INTEGER (0..7),

sl10 INTEGER (0..9),

sl16 INTEGER (0..15),

sl20 INTEGER (0..19),

sl40 INTEGER (0..39),

sl80 INTEGER (0..79),

sl160 INTEGER (0..159),

sl320 INTEGER (0..319),

sl640 INTEGER (0..639)

} OPTIONAL, -- Need M

resource PUCCH-ResourceId OPTIONAL -- Need M

}

SchedulingRequestResourceConfigExt-v1610 ::= SEQUENCE {

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

...

}

SchedulingRequestResourceConfigExt-v17xy ::= SEQUENCE {

periodicityAndOffset-r17 CHOICE {

sl1280 INTEGER (0..1279),

sl2560 INTEGER (0..2559),

sl5120 INTEGER (0..5119)

} OPTIONAL -- Need M

}

-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SchedulingRequestResourceConfig* field descriptions** |
| ***periodicityAndOffset***  SR periodicity and offset in number of symbols or slots (see TS 38.213 [13], clause 9.2.4) The following periodicities may be configured depending on the chosen subcarrier spacing:  SCS = 15 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 5sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl  SCS = 30 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl, 160sl  SCS = 60 kHz: 2sym, 7sym/6sym, 1sl, 2sl, 4sl, 8sl, 16sl, 20sl, 40sl, 80sl, 160sl, 320sl  SCS = 120 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640sl  SCS = 480 kHz: 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640sl, 1280sl, 2560sl  SCS = 960 kHz: 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640sl, 1280sl, 2560sl, 5120sl  sym6or7 corresponds to 6 symbols if extended cyclic prefix and a SCS of 60 kHz are configured, otherwise it corresponds to 7 symbols.  For periodicities 2sym, 7sym and sl1 the UE assumes an offset of 0 slots.  If *SchedulingRequestResourceConfigExt-v17xy* is present, any previously configured *SchedulingRequestResourceConfigExt* (without suffix) is released, and vice versa. |
| ***phy-PriorityIndex***  Indicates whether this scheduling request resource is *high* or *low* priority in PHY prioritization/multiplexing handling (see TS 38.213 [13], clause 9.2.4). Value *p0* indicates low priority and value *p1* indicates high priority. |
| ***resource***  ID of the PUCCH resource in which the UE shall send the scheduling request. The actual *PUCCH-Resource* is configured in *PUCCH-Config* of the same UL BWP and serving cell as this *SchedulingRequestResourceConfig*. The network configures a *PUCCH-Resource* of *PUCCH-format0* or *PUCCH-format1* (other formats not supported) (see TS 38.213 [13], clause 9.2.4) |
| ***schedulingRequestID***  The ID of the *SchedulingRequestConfig* that uses this scheduling request resource. |

< Unmodified parts omitted >

– *SCS-SpecificCarrier*

The IE *SCS-SpecificCarrier* provides parameters determining the location and width of the actual carrier or the carrier bandwidth. It is defined specifically for a numerology (subcarrier spacing (SCS)) and in relation (frequency offset) to Point A.

***SCS-SpecificCarrier* information element**

-- ASN1START

-- TAG-SCS-SPECIFICCARRIER-START

SCS-SpecificCarrier ::= SEQUENCE {

offsetToCarrier INTEGER (0..2199),

subcarrierSpacing SubcarrierSpacing,

carrierBandwidth INTEGER (1..maxNrofPhysicalResourceBlocks),

...,

[[

txDirectCurrentLocation INTEGER (0..4095) OPTIONAL -- Need S

]]

}

-- TAG-SCS-SPECIFICCARRIER-STOP

-- ASN1STOP

|  |
| --- |
| ***SCS-SpecificCarrier* field descriptions** |
| ***carrierBandwidth***  Width of this carrier in number of PRBs (using the *subcarrierSpacing* defined for this carrier) (see TS 38.211 [16], clause 4.4.2). |
| ***offsetToCarrier***  Offset in frequency domain between Point A (lowest subcarrier of common RB 0) and the lowest usable subcarrier on this carrier in number of PRBs (using the subcarrierSpacing defined for this carrier). The maximum value corresponds to 275\*8-1. See TS 38.211 [16], clause 4.4.2. |
| ***txDirectCurrentLocation***  Indicates the downlink Tx Direct Current location for the carrier. A value in the range 0..3299 indicates the subcarrier index within the carrier. The values in the value range 3301..4095 are reserved and ignored by the UE. If this field is absent for downlink within *ServingCellConfigCommon* and *ServingCellConfigCommonSIB*, the UE assumes the default value of 3300 (i.e. "Outside the carrier"). (see TS 38.211 [16], clause 4.4.2). Network does not configure this field via *ServingCellConfig* or for uplink carriers. |
| ***subcarrierSpacing***  Subcarrier spacing of this carrier. It is used to convert the offsetToCarrier into an actual frequency.  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 |

< Unmodified parts omitted >

– *SearchSpace*

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

***SearchSpace* information element**

-- ASN1START

-- TAG-SEARCHSPACE-START

SearchSpace ::= SEQUENCE {

searchSpaceId SearchSpaceId,

controlResourceSetId ControlResourceSetId OPTIONAL, -- Cond SetupOnly

monitoringSlotPeriodicityAndOffset CHOICE {

sl1 NULL,

sl2 INTEGER (0..1),

sl4 INTEGER (0..3),

sl5 INTEGER (0..4),

sl8 INTEGER (0..7),

sl10 INTEGER (0..9),

sl16 INTEGER (0..15),

sl20 INTEGER (0..19),

sl40 INTEGER (0..39),

sl80 INTEGER (0..79),

sl160 INTEGER (0..159),

sl320 INTEGER (0..319),

sl640 INTEGER (0..639),

sl1280 INTEGER (0..1279),

sl2560 INTEGER (0..2559)

} OPTIONAL, -- Cond Setup4

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

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

nrofCandidates SEQUENCE {

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

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

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

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

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

} OPTIONAL, -- Cond Setup

searchSpaceType CHOICE {

common SEQUENCE {

dci-Format0-0-AndFormat1-0 SEQUENCE {

...

} OPTIONAL, -- Need R

dci-Format2-0 SEQUENCE {

nrofCandidates-SFI SEQUENCE {

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

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

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

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

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

},

...

} OPTIONAL, -- Need R

dci-Format2-1 SEQUENCE {

...

} OPTIONAL, -- Need R

dci-Format2-2 SEQUENCE {

...

} OPTIONAL, -- Need R

dci-Format2-3 SEQUENCE {

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

dummy2 ENUMERATED {n1, n2},

...

} OPTIONAL -- Need R

},

ue-Specific SEQUENCE {

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

...,

[[

dci-Formats-MT-r16 ENUMERATED {formats2-5} OPTIONAL, -- Need R

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

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

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

OPTIONAL -- Need R

]]

}

} OPTIONAL -- Cond Setup2

}

SearchSpaceExt-r16 ::= SEQUENCE {

controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL, -- Cond SetupOnly2

searchSpaceType-r16 SEQUENCE {

common-r16 SEQUENCE {

dci-Format2-4-r16 SEQUENCE {

nrofCandidates-CI-r16 SEQUENCE {

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

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

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

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

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

},

...

} OPTIONAL, -- Need R

dci-Format2-5-r16 SEQUENCE {

nrofCandidates-IAB-r16 SEQUENCE {

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

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

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

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

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

},

...

} OPTIONAL, -- Need R

dci-Format2-6-r16 SEQUENCE {

...

} OPTIONAL, -- Need R

...

}

} OPTIONAL, -- Cond Setup3

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

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

}

SearchSpaceExt2-r17 ::= SEQUENCE {

monitoringSlotPeriodicityAndOffset-r17 CHOICE {

sl32 INTEGER (0..31),

sl64 INTEGER (0..63),

sl128 INTEGER (0..127),

sl5120 INTEGER (0..5119),

sl10240 INTEGER (0..10239),

sl20480 INTEGER (0..20479)

} OPTIONAL, -- Cond Setup5

monitoringSlotsWithinSlotGroup-r17 BIT STRING (SIZE (8)) OPTIONAL, -- Need R

...

}

-- TAG-SEARCHSPACE-STOP

-- ASN1STOP

|  |
| --- |
| ***SearchSpace* field descriptions** |
| ***common***  Configures this search space as common search space (CSS) and DCI formats to monitor. |
| ***controlResourceSetId***  The CORESET applicable for this SearchSpace. Value 0 identifies the common CORESET#0 configured in MIB and in *ServingCellConfigCommon*. Values 1..*maxNrofControlResourceSets-1* identify CORESETs configured in System Information or by dedicated signalling. The CORESETs with *non-zero controlResourceSetId* are configured in the same BWP as this *SearchSpace*. If the field *controlResourceSetId-r16* is present, UE shall ignore the *controlResourceSetId* (without suffix). |
| ***dummy1, dummy2***  This field is not used in the specification. If received it shall be ignored by the UE. |
| ***dci-Format0-0-AndFormat1-0***  If configured, the UE monitors the DCI formats 0\_0 and 1\_0 according to TS 38.213 [13], clause 10.1. |
| ***dci-Format2-0***  If configured, UE monitors the DCI format 2\_0 according to TS 38.213 [13], clause 10.1, 11.1.1. |
| ***dci-Format2-1***  If configured, UE monitors the DCI format 2\_1 according to TS 38.213 [13], clause 10.1, 11.2. |
| ***dci-Format2-2***  If configured, UE monitors the DCI format 2\_2 according to TS 38.213 [13], clause 10.1, 11.3. |
| ***dci-Format2-3***  If configured, UE monitors the DCI format 2\_3 according to TS 38.213 [13], clause 10.1, 11.4 |
| ***dci-Format2-4***  If configured, UE monitors the DCI format 2\_4 according to TS 38.213 [13], clause 11.2A. |
| ***dci-Format2-5***  If configured, IAB-MT monitors the DCI format 2\_5 according to TS 38.213 [13], clause 14. |
| ***dci-Format2-6***  If configured, UE monitors the DCI format 2\_6 according to TS 38.213 [13], clause 10.1, 11.5. DCI format 2\_6 can only be configured on the SpCell. |
| ***dci-Formats***  Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1. |
| ***dci-FormatsExt***  If this field is present, the field *dci-Formats* is ignored and *dci-FormatsExt* is used instead to indicate whether the UE monitors in this USS for DCI format 0\_2 and 1\_2 or formats 0\_1 and 1\_1 and 0\_2 and 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 10.1). This field is not configured for operation with shared spectrum channel access in this release*.* |
| ***dci-Formats-MT***  Indicates whether the IAB-MT monitors the DCI formats 2-5 according to TS 38.213 [13], clause 14. |
| ***dci-FormatsSL***  Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1 or for format 3-0 or for format 3-1 or for formats 3-0 and 3-1. If this field is present, the field *dci-Formats* is ignored and *dci-FormatsSL* is used. |
| ***duration***  Number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the UE applies the value 1 slot, except for DCI format 2\_0. The UE ignores this field for DCI format 2\_0. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*).  For IAB-MT, duration indicates number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the IAB-MT applies the value 1 slot, except for DCI format 2\_0 and DCI format 2\_5. The IAB-MT ignores this field for DCI format 2\_0 and DCI format 2\_5. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*). |
| ***freqMonitorLocations***  Defines an association of the search space to multiple monitoring locations in the frequency domain and indicates whether the pattern configured in the associated CORESET is replicated to a specific RB set, see TS 38.213, clause 10.1. Each bit in the bitmap corresponds to one RB set, and the leftmost (most significant) bit corresponds to RB set 0 in the BWP. A bit set to 1 indicates that a frequency domain resource allocation replicated from the pattern configured in the associated CORESET is mapped to the RB set. |
| ***monitoringSlotPeriodicityAndOffset***  Slots for PDCCH Monitoring configured as periodicity and offset. If the UE is configured to monitor DCI format 2\_1, only the values 'sl1', 'sl2' or 'sl4' are applicable. If the UE is configured to monitor DCI format 2\_0, only the values ′sl1′, ′sl2′, ′sl4′, ′sl5′, ′sl8′, ′sl10′, ′sl16′, and ′sl20′ are applicable (see TS 38.213 [13], clause 10). If the UE is configured to monitor DCI format 2\_4, only the values 'sl1', 'sl2', 'sl4', 'sl5', 'sl8' and 'sl10' are applicable.  For IAB-MT, If the IAB-MT is configured to monitor DCI format 2\_1, only the values 'sl1', 'sl2' or 'sl4' are applicable. If the IAB-MT is configured to monitor DCI format 2\_0 or DCI format 2\_5, only the values ′sl1′, ′sl2′, ′sl4′, ′sl5′, ′sl8′, ′sl10′, ′sl16′, and ′sl20′ are applicable (see TS 38.213, clause 10).  If *monitoringSlotPeriodicityAndOffset-r17* is present, any previously configured *monitoringSlotPeriodicityAndOffset* is released, and if *monitoringSlotPeriodicityAndOffset* is present, any previously configured *monitoringSlotPeriodicityAndOffset-r17* is released. |
| ***monitoringSlotsWithinSlotGroup***  Indicates which slot(s) within a slot group are configured for multi-slot PDCCH monitoring. The first (leftmost, most significant) bit represents the first slot in the slot group, the second bit represents the second slot in the slot group, and so on. A bit set to ‘1’ indicates that the corresponding slot is configured for multi-slot PDCCH monitoring (see TS 38.213, clause 10). |
| ***monitoringSymbolsWithinSlot***  The first symbol(s) for PDCCH monitoring in the slots configured for (multi-slot) PDCCH monitoring (see *monitoringSlotPeriodicityAndOffset* and *duration*). The most significant (left) bit represents the first OFDM in a slot, and the second most significant (left) bit represents the second OFDM symbol in a slot and so on. The bit(s) set to one identify the first OFDM symbol(s) of the control resource set within a slot. If the cyclic prefix of the BWP is set to extended CP, the last two bits within the bit string shall be ignored by the UE or IAB-MT.  For DCI format 2\_0, the first one symbol applies if the *duration* of CORESET (in the IE *ControlResourceSet*) identified by *controlResourceSetId* indicates 3 symbols, the first two symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 2 symbols, and the first three symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 1 symbol.  See TS 38.213 [13], clause 10.  For IAB-MT: For DCI format 2\_0 or DCI format 2\_5, the first one symbol applies if the duration of CORESET (in the IE *ControlResourceSet*) identified by *controlResourceSetId* indicates 3 symbols, the first two symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 2 symbols, and the first three symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 1 symbol.  See TS 38.213 [13], clause 10. |
| ***nrofCandidates-CI***  The number of PDCCH candidates specifically for format 2-4 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 10.1). |
| ***nrofCandidates-SFI***  The number of PDCCH candidates specifically for format 2-0 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 11.1.1). For a search space configured with *freqMonitorLocations-r16*, only value ′n1′ is valid. |
| ***nrofCandidates***  Number of PDCCH candidates per aggregation level. The number of candidates and aggregation levels configured here applies to all formats unless a particular value is specified or a format-specific value is provided (see inside *searchSpaceType*). If configured in the *SearchSpace* of a cross carrier scheduled cell, this field determines the number of candidates and aggregation levels to be used on the linked scheduling cell (see TS 38.213 [13], clause 10). |
| ***searchSpaceGroupIdList***  List of search space group IDs which the search space is associated with. The network configures at most 2 search space groups per BWP where the group ID is either 0 or 1. |
| ***searchSpaceId***  Identity of the search space. SearchSpaceId = 0 identifies the *searchSpaceZero* configured via PBCH (MIB) or *ServingCellConfigCommon* and may hence not be used in the *SearchSpace* IE. The *searchSpaceId* is unique among the BWPs of a Serving Cell. In case of cross carrier scheduling, search spaces with the same *searchSpaceId* in scheduled cell and scheduling cell are linked to each other. The UE applies the search space for the scheduled cell only if the DL BWPs in which the linked search spaces are configured in scheduling cell and scheduled cell are both active.  For an IAB-MT, the search space defines how/where to search for PDCCH candidates for an IAB-MT. Each search space is associated with one ControlResearchSet. For a scheduled cell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent. |
| ***searchSpaceType***  Indicates whether this is a common search space (present) or a UE specific search space as well as DCI formats to monitor for. |
| ***ue-Specific***  Configures this search space as UE specific search space (USS). The UE monitors the DCI format with CRC scrambled by C-RNTI, CS-RNTI (if configured), and SP-CSI-RNTI (if configured) |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Setup* | This field is mandatory present upon creation of a new *SearchSpace*. It is optionally present, Need M, otherwise. |
| *Setup2* | This field is mandatory present when a new *SearchSpace* is set up, if the same *SearchSpace* ID is not included in *searchSpacesToAddModListExt-r16* of the parent IE with the field *searchSpaceType-r16* included. Otherwise it is optionally present, Need M. |
| *Setup3* | This field is mandatory present when a new *SearchSpace* is set up, if the same *SearchSpace* ID is not included in *searchSpacesToAddModListExt* (without suffix) of the parent IE with the field *searchSpaceType* (without suffix) included. Otherwise it is optionally present, Need M. |
| *Setup4* | This field is mandatory present upon creation of a new *SearchSpace* if *monitoringSlotPeriodicityAndOffset-r17* is not included. It is optionally present, Need M, otherwise. |
| *Setup5* | This field is mandatory present upon creation of a new *SearchSpace* if *monitoringSlotPeriodicityAndOffset* (without suffix) is not included. It is optionally present, Need M, otherwise. |
| *SetupOnly* | This field is mandatory present upon creation of a new *SearchSpace*. It is absent, Need M, otherwise. |
| *SetupOnly2* | In PDCCH-Config, the field is optionally present upon creation of a new SearchSpace and absent, Need M upon reconfiguration of an existing SearchSpace.  In PDCCH-ConfigCommon, the field is absent. |

< Unmodified parts omitted >

– *ServingCellConfig*

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

***ServingCellConfig* information element**

-- ASN1START

-- TAG-SERVINGCELLCONFIG-START

ServingCellConfig ::= SEQUENCE {

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

initialDownlinkBWP BWP-DownlinkDedicated OPTIONAL, -- Need M

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

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

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

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

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

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

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

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

uplinkConfig UplinkConfig OPTIONAL, -- Need M

supplementaryUplink UplinkConfig OPTIONAL, -- Need M

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

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

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

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

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

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

crossCarrierSchedulingConfig CrossCarrierSchedulingConfig OPTIONAL, -- Need M

tag-Id TAG-Id,

dummy1 ENUMERATED {enabled} OPTIONAL, -- Need R

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

servingCellMO MeasObjectId OPTIONAL, -- Cond MeasObject

...,

[[

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

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

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

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

]],

[[

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

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

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

ca-SlotOffset-r16 CHOICE {

refSCS15kHz INTEGER (-2..2),

refSCS30KHz INTEGER (-5..5),

refSCS60KHz INTEGER (-10..10),

refSCS120KHz INTEGER (-20..20)

} OPTIONAL, -- Cond AsyncCA

dummy2 SetupRelease { DummyJ } OPTIONAL, -- Need M

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

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

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

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

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

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

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

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

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

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

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

]],

[[

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

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

]],

[[

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

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

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

]]

}

UplinkConfig ::= SEQUENCE {

initialUplinkBWP BWP-UplinkDedicated OPTIONAL, -- Need M

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

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

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

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

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

...,

[[

powerBoostPi2BPSK BOOLEAN OPTIONAL, -- Need M

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

]],

[[

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

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

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

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

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

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

]]

}

DummyJ ::= SEQUENCE {

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

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

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

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

}

ChannelAccessConfig-r16 ::= SEQUENCE {

energyDetectionConfig-r16 CHOICE {

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

energyDetectionThresholdOffset-r16 INTEGER (-13..20)

} OPTIONAL, -- Need R

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

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

}

IntraCellGuardBandsPerSCS-r16 ::= SEQUENCE {

guardBandSCS-r16 SubcarrierSpacing,

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

}

GuardBand-r16 ::= SEQUENCE {

startCRB-r16 INTEGER (0..274),

nrofCRBs-r16 INTEGER (0..15)

}

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

DormantBWP-Config-r16::= SEQUENCE {

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

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

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

}

WithinActiveTimeConfig-r16 ::= SEQUENCE {

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

dormancyGroupWithinActiveTime-r16 DormancyGroupID-r16 OPTIONAL -- Need R

}

OutsideActiveTimeConfig-r16 ::= SEQUENCE {

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

dormancyGroupOutsideActiveTime-r16 DormancyGroupID-r16 OPTIONAL -- Need R

}

UplinkTxSwitching-r16 ::= SEQUENCE {

uplinkTxSwitchingPeriodLocation-r16 BOOLEAN,

uplinkTxSwitchingCarrier-r16 ENUMERATED {carrier1, carrier2}

}

-- TAG-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***ChannelAccessConfig* field descriptions** |
| ***absenceOfAnyOtherTechnology***  Presence of this field indicates absence on a long term basis (e.g. by level of regulation) of any other technology sharing the carrier; absence of this field indicates the potential presence of any other technology sharing the carrier, as specified in TS 37.213 [48] clauses 4.2.1 and 4.2.3. |
| ***energyDetectionConfig***  Indicates whether to use the *maxEnergyDetectionThreshold* or the *energyDetectionThresholdOffset* (see TS 37.213 [48], clause 4.2.3)*.* |
| ***energyDetectionThresholdOffset***  Indicates the offset to the default maximum energy detection threshold value. Unit in dB. Value -13 corresponds to -13dB, value -12 corresponds to -12dB, and so on (i.e. in steps of 1dB) as specified in TS 37.213 [48], clause 4.2.3. |
| ***maxEnergyDetectionThreshold***  Indicates the absolute maximum energy detection threshold value. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm) as specified in TS 37.213 [48], clause 4.2.3. |
| ***ul-toDL-COT-SharingED-Threshold***  Maximum energy detection threshold that the UE should use to share channel occupancy with gNB for DL transmission as specified in TS 37.213 [48], clause 4.1.3 for downlink channel access and clause 4.2.3 for uplink channel access. |

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| ***ServingCellConfig* field descriptions** |
| ***bwp-InactivityTimer***  The duration in ms after which the UE falls back to the default Bandwidth Part (see TS 38.321 [3], clause 5.15). When the network releases the timer configuration, the UE stops the timer without switching to the default BWP. |
| ***ca-SlotOffset***  Slot offset between the primary cell (PCell/PSCell) and the SCell in unaligned frame boundary with slot alignment and partial SFN alignment inter-band CA. Based on this field, the UE determines the time offset of the SCell as specified in clause 4.5 of TS 38.211 [16]. The granularity of this field is determined by the reference SCS for the slot offset (i.e. the maximum of PCell/PSCell lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB* and this serving cell's lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*).  The Network configures at most single non-zero offset duration in ms (independent on SCS) among CCs in the unaligned CA configuration. If the field is absent, the UE applies the value of 0. The slot offset value can only be changed with SCell release and add. |
| ***cbg-TxDiffTBsProcessingType1, cbg-TxDiffTBsProcessingType2***  Indicates whether processing types 1 and 2 based CBG based operation is enabled according to Rel-16 UE capabilities. |
| ***channelAccessConfig***  List of parameters used for access procedures of operation with shared spectrum channel access (see TS 37.213 [48). |
| ***channelAccessMode2***  If present, this field indicates that the UE shall apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE does not apply these channel access procedures.  Overwrites the corresponding field in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB* for this serving cell. |
| ***crossCarrierSchedulingConfig***  Indicates whether this serving cell is cross-carrier scheduled by another serving cell or whether it cross-carrier schedules another serving cell. |
| ***crs-RateMatch-PerCORESETPoolIndex***  Indicates how UE performs rate matching when both lte-CRS-PatternList1-r16 and lte-CRS-PatternList2-r16 are configured as specified in TS 38.214 [19], clause 5.1.4.2. |
| ***csi-RS-ValidationWithDCI***  Indicates how the UE performs periodic and semi-persistent CSI-RS reception in a slot. The presence of this field indicates that the UE uses DCI detection to validate whether to receive CSI-RS (see TS 38.213 [13], clause 11.1). |
| ***defaultDownlinkBWP-Id***  The initial bandwidth part is referred to by BWP-Id = 0. ID of the downlink bandwidth part to be used upon expiry of the BWP inactivity timer. This field is UE specific. When the field is absent the UE uses the initial BWP as default BWP. (see TS 38.213 [13], clause 12 and TS 38.321 [3], clause 5.15). |
| ***directionalCollisionHandling***  Indicates that this serving cell is using directional collision handling between a reference and other cell(s) for half-duplex operation in TDD CA with same SCS as specified in TS 38.213 [13], clause 11.1. The half-duplex operation only applies within the same frequency range and cell group. The network only configures this field for TDD serving cells that are using the same SCS. |
| ***dormantBWP-Config***  The dormant BWP configuration for an SCell. This field can be configured only for a (non-PUCCH) SCell. |
| ***downlinkBWP-ToAddModList***  List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12). |
| ***downlinkBWP-ToReleaseList***  List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12). |
| ***downlinkChannelBW-PerSCS-List***  A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *DownlinkConfigCommon* / *DownlinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |
| ***dummy1, dummy 2***  This field is not used in the specification. If received it shall be ignored by the UE. |
| ***enableBeamSwitchTiming***  Indicates the aperiodic CSI-RS triggering with beam switching triggering behaviour as defined in clause 5.2.1.5.1 of TS 38.214 [19]. |
| ***enableDefaultTCI-StatePerCoresetPoolIndex***  Presence of this field indicates the UE shall follow the release 16 behavior of default TCI state per CORESETPoolindex when the UE is configured by higher layer parameter PDCCH-Config that contains two different values of CORESETPoolIndex in ControlResourceSet is enabled. |
| ***enableTwoDefaultTCI-States***  Presence of this field indicates the UE shall follow the release 16 behavior of two default TCI states for PDSCH when at least one TCI codepoint is mapped to two TCI states is enabled |
| ***firstActiveDownlinkBWP-Id***  If configured for an SpCell, this field contains the ID of the DL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.  If configured for an SCell, this field contains the ID of the downlink bandwidth part to be used upon activation of an SCell. The initial bandwidth part is referred to by BWP-Id = 0.  Upon reconfiguration with *reconfigurationWithSync*, the network sets the *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* to the same value. |
| ***initialDownlinkBWP***  The dedicated (UE-specific) configuration for the initial downlink bandwidth-part (i.e. DL BWP#0). If any of the optional IEs are configured within this IE, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***intraCellGuardBandsDL-List, intraCellGuardBandsUL-List***  List of intra-cell guard bands in a serving cell for operation with shared spectrum channel access. If not configured, the guard bands are defined according to 38.101-1 [15], see TS 38.214 [19], clause 7. For operation in licensed spectrum, this field is absent, and no UE action is required. |
| ***lte-CRS-PatternList1***  A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. The network does not configure this field and *lte-CRS-ToMatchAround* simultaneously. |
| ***lte-CRS-PatternList2***  A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured with 1. This list is configured only if CORESETPoolIndex configured with 1. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in lte-CRS-PatternList1, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in lte-CRS-PatternList1, and so on. Network configures this field only if the field *lte-CRS-ToMatchAround* is not configured and there is at least one ControlResourceSet in one DL BWP of this serving cell with *coresetPoolIndex* set to 1. |
| ***lte-CRS-ToMatchAround***  Parameters to determine an LTE CRS pattern that the UE shall rate match around. |
| ***nrofHARQ-BundlingGroups***  Indicates the number of HARQ bundling groups for type2 HARQ-ACK codebook. |
| ***pathlossReferenceLinking***  Indicates whether UE shall apply as pathloss reference either the downlink of SpCell (PCell for MCG or PSCell for SCG) or of SCell that corresponds with this uplink (see TS 38.213 [13], clause 7). |
| ***pdsch-ServingCellConfig***  PDSCH related parameters that are not BWP-specific. |
| ***rateMatchPatternToAddModList***  Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology. See TS 38.214 [19], clause 5.1.4.1. |
| ***sCellDeactivationTimer***  SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity. |
| ***servingCellMO***  *measObjectId* of the *MeasObjectNR* in *MeasConfig* which is associated to the serving cell. For this *MeasObjectNR*, the following relationship applies between this MeasObjectNR and *frequencyInfoDL* in *ServingCellConfigCommon* of the serving cell: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* and if *csi-rs-ResourceConfigMobility* is configured, the value of its *subcarrierSpacing* is present in one entry of the *scs-SpecificCarrierList*, *csi-RS-CellListMobility* includes an entry corresponding to the serving cell (with *cellId* equal to *physCellId* in *ServingCellConfigCommon*) and the frequency range indicated by the *csi-rs-MeasurementBW* of the entry in *csi-RS-CellListMobility* is included in the frequency range indicated by in the entry of the *scs-SpecificCarrierList*. |
| ***supplementaryUplink***  Network may configure this field only when *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon* or *supplementaryUplink* is configured in *ServingCellConfigCommonSIB*. |
| ***supplementaryUplinkRelease***  If this field is included, the UE shall release the uplink configuration configured by *supplementaryUplink*. The network only includes either *supplementaryUplinkRelease* or *supplementaryUplink* at a time. |
| ***tag-Id***  Timing Advance Group ID, as specified in TS 38.321 [3], which this cell belongs to. |
| ***tdd-UL-DL-ConfigurationDedicated-IAB-MT***  Resource configuration per IAB-MT D/U/F overrides all symbols (with a limitation that effectively only flexible symbols can be overwritten in Rel-16) per slot over the number of slots as provided by *TDD-UL-DL ConfigurationCommon*. |
| ***uplinkConfig***  Network may configure this field only when *uplinkConfigCommon* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. Addition or release of this field can only be done upon SCell addition or release (respectively). |

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

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

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

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

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| **Conditional Presence** | **Explanation** |
| *AsyncCA* | This field is mandatory present for SCells whose slot offset between the SpCell is not 0. Otherwise it is absent, Need S. |
| *MeasObject* | This field is mandatory present for the SpCell if the UE has a *measConfig*, and it is optionally present, Need M, for SCells. |
| *SCellOnly* | This field is optionally present, Need R, for SCells. It is absent otherwise. |
| *ServingCellWithoutPUCCH* | This field is optionally present, Need S, for SCells except PUCCh SCells. It is absent otherwise. |
| *SyncAndCellAdd* | This field is mandatory present for a SpCell upon reconfiguration with *reconfigurationWithSync* and upon *RRCSetup*/*RRCResume*.  The field is optionally present for an SpCell, Need N, upon reconfiguration without *reconfigurationWithSync*.  The field is mandatory present for an SCell upon addition, and absent for SCell in other cases, Need M. |
| *TDD* | This field is optionally present, Need R, for TDD cells. It is absent otherwise. |
| *TDD\_IAB* | For IAB-MT, this field is optionally present, Need R, for TDD cells. It is absent otherwise. |

– *ServingCellConfigCommon*

The IE *ServingCellConfigCommon* is used to configure cell specific parameters of a UE's serving cell. The IE contains parameters which a UE would typically acquire from SSB, MIB or SIBs when accessing the cell from IDLE. With this IE, the network provides this information in dedicated signalling when configuring a UE with a SCells or with an additional cell group (SCG). It also provides it for SpCells (MCG and SCG) upon reconfiguration with sync.

***ServingCellConfigCommon* information element**

-- ASN1START

-- TAG-SERVINGCELLCONFIGCOMMON-START

ServingCellConfigCommon ::= SEQUENCE {

physCellId PhysCellId OPTIONAL, -- Cond HOAndServCellAdd,

downlinkConfigCommon DownlinkConfigCommon OPTIONAL, -- Cond HOAndServCellAdd

uplinkConfigCommon UplinkConfigCommon OPTIONAL, -- Need M

supplementaryUplinkConfig UplinkConfigCommon OPTIONAL, -- Need S

n-TimingAdvanceOffset ENUMERATED { n0, n25600, n39936 } OPTIONAL, -- Need S

ssb-PositionsInBurst CHOICE {

shortBitmap BIT STRING (SIZE (4)),

mediumBitmap BIT STRING (SIZE (8)),

longBitmap BIT STRING (SIZE (64))

} OPTIONAL, -- Cond AbsFreqSSB

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

dmrs-TypeA-Position ENUMERATED {pos2, pos3},

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

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

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

ssbSubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond HOAndServCellWithSSB

tdd-UL-DL-ConfigurationCommon TDD-UL-DL-ConfigCommon OPTIONAL, -- Cond TDD

ss-PBCH-BlockPower INTEGER (-60..50),

...,

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channelAccessMode-r16 CHOICE {

dynamic NULL,

semiStatic SemiStaticChannelAccessConfig-r16

} OPTIONAL, -- Cond SharedSpectrum

discoveryBurstWindowLength-r16 ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5} OPTIONAL, -- Need R

ssb-PositionQCL-r16 SSB-PositionQCL-Relation-r16 OPTIONAL, -- Cond SharedSpectrum

highSpeedConfig-r16 HighSpeedConfig-r16 OPTIONAL -- Need R

]],

[[

channelAccessMode2-r17 ENUMERATED {enabled} OPTIONAL, -- Cond SharedSpectrum2

discoveryBurstWindowLength-r17 ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot75, ms1, ms1dot25} OPTIONAL -- Need R

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}

-- TAG-SERVINGCELLCONFIGCOMMON-STOP

-- ASN1STOP

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| ***ServingCellConfigCommon* field descriptions** |
| ***channelAccessMode***  If present, this field indicates which channel access procedures to apply for operation with shared spectrum channel access as defined in TS 37.213 [48]. If the field is configured as "semiStatic", the UE shall apply the channel access procedures for semi-static channel occupancy as described in subclause 4.3 in TS 37.213. If the field is configured as "dynamic", the UE shall apply the channel access procedures in TS 37.213, with the exception of subclause 4.3 of TS 37.213. |
| ***channelAccessMode2***  If present (‘enabled’), the UE shall apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE shall not apply any channel access procedure. |
| ***dmrs-TypeA-Position***  Position of (first) DM-RS for downlink (see TS 38.211 [16], clause 7.4.1.1.1) and uplink (TS 38.211 [16], clause 6.4.1.1.3). |
| ***downlinkConfigCommon***  The common downlink configuration of the serving cell, including the frequency information configuration and the initial downlink BWP common configuration. The parameters provided herein should match the parameters configured by MIB and SIB1 (if provided) of the serving cell, with the exception of *controlResourceSetZero* and *searchSpaceZero* which can be configured in *ServingCellConfigCommon* even if MIB indicates that they are absent. |
| ***discoveryBurstWindowLength***  Indicates the window length of the discovery burst in ms (see TS 37.213 [48]). The field *discoveryBurstWindowLength-r17* is applicable to SCS 480 kHz and SCS 960 kHz. |
| ***longBitmap***  Bitmap when maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1. |
| ***lte-CRS-ToMatchAround***  Parameters to determine an LTE CRS pattern that the UE shall rate match around. |
| ***mediumBitmap***  Bitmap when maximum number of SS/PBCH blocks per half frame equals to 8 as defined in TS 38.213 [13], clause 4.1. |
| ***n-TimingAdvanceOffset***  The N\_TA-Offset to be applied for all uplink transmissions on this serving cell. If the field is absent, the UE applies the value defined for the duplex mode and frequency range of this serving cell. See TS 38.133 [14], table 7.1.2-2. |
| ***rateMatchPatternToAddModList***  Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology (see TS 38.214 [19], clause 5.1.4,1). |
| ***shortBitmap***  Bitmap when maximum number of SS/PBCH blocks per half frame equals to 4 as defined in TS 38.213 [13], clause 4.1. |
| ***ss-PBCH-BlockPower***  Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7. |
| ***ssb-periodicityServingCell***  The SSB periodicity in ms for the rate matching purpose. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1) |
| ***ssb-PositionQCL***  Indicates the QCL relation between SSB positions for this serving cell as specified in TS 38.213 [13], clause 4.1. |
| ***ssb-PositionsInBurst***  For operation in licensed spectrum, indicates the time domain positions of the transmitted SS-blocks in a half frame with SS/PBCH blocks as defined in TS 38.213 [13], clause 4.1. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not transmitted while value 1 indicates that the corresponding SS/PBCH block is transmitted. The network configures the same pattern in this field as in the corresponding field in ServingCellConfigCommonSIB.  For operation with shared spectrum channel access, the UE assumes that one or more SS/PBCH blocks indicated by *ssb-PositionsInBurst* may be transmitted within the discovery burst transmission window and have candidate SS/PBCH blocks indexes corresponding to SS/PBCH block indexes provided by *ssb-PositionsInBurst* (see TS 38.213 [13], clause 4.1). If the k-th bit of *ssb-PositionsInBurst* is set to 1, the UE assumes that one or more SS/PBCH blocks within the discovery burst transmission window with candidate SS/PBCH block indexes corresponding to SS/PBCH block index equal to k – 1 may be transmitted; if the kt-th bit is set to 0, the UE assumes that the corresponding SS/PBCH block(s) are not transmitted. The k-th bit is set to 0, where k > *ssb-PositionQCL* and the number of actually transmitted SS/PBCH blocks is not larger than the number of 1's in the bitmap. The network configures the same pattern in this field as in the corresponding field in *ServingCellConfigCommonSIB*.For operation with shared spectrum channel access in FR1, only *mediumBitmap* is used, and for FR2-2, *longBitmap* is used. |
| ***ssbSubcarrierSpacing***  Subcarrier spacing of SSB.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |
| ***supplementaryUplinkConfig***  The network configures this field only if *uplinkConfigCommon* is configured. If this field is absent, the UE shall release the *supplementaryUplinkConfig* and the *supplementaryUplink* configured in *ServingCellConfig* of this serving cell, if configured. |
| ***tdd-UL-DL-ConfigurationCommon***  A cell-specific TDD UL/DL configuration, see TS 38.213 [13], clause 11.1. |

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| **Conditional Presence** | **Explanation** |
| *AbsFreqSSB* | The field is absent when *absoluteFrequencySSB* in frequencyInfoDL is absent, otherwise the field is mandatory present. |
| *HOAndServCellAdd* | This field is mandatory present upon SpCell change and upon serving cell (PSCell/SCell) addition. Otherwise, the field is absent. |
| *HOAndServCellWithSSB* | This field is mandatory present upon SpCell change and upon serving cell (SCell with SSB or PSCell) addition. Otherwise, the field is absent. |
| *SharedSpectrum* | This field is mandatory present if this cell operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R. |
| *SharedSpectrum2* | This field is optionally present if this cell operates with shared spectrum channel access in FR2-2. Otherwise, it is absent, Need R. |
| *TDD* | The field is optionally present, Need R, for TDD cells; otherwise it is absent. |

– *ServingCellConfigCommonSIB*

The IE *ServingCellConfigCommonSIB* is used to configure cell specific parameters of a UE's serving cell in SIB1.

***ServingCellConfigCommonSIB* information element**

-- ASN1START

-- TAG-SERVINGCELLCONFIGCOMMONSIB-START

ServingCellConfigCommonSIB ::= SEQUENCE {

downlinkConfigCommon DownlinkConfigCommonSIB,

uplinkConfigCommon UplinkConfigCommonSIB OPTIONAL, -- Need R

supplementaryUplink UplinkConfigCommonSIB OPTIONAL, -- Need R

n-TimingAdvanceOffset ENUMERATED { n0, n25600, n39936 } OPTIONAL, -- Need S

ssb-PositionsInBurst SEQUENCE {

inOneGroup BIT STRING (SIZE (8)),

groupPresence BIT STRING (SIZE (8)) OPTIONAL -- Cond FR2-Only

},

ssb-PeriodicityServingCell ENUMERATED {ms5, ms10, ms20, ms40, ms80, ms160},

tdd-UL-DL-ConfigurationCommon TDD-UL-DL-ConfigCommon OPTIONAL, -- Cond TDD

ss-PBCH-BlockPower INTEGER (-60..50),

...,

[[

channelAccessMode-r16 CHOICE {

dynamic NULL,

semiStatic SemiStaticChannelAccessConfig-r16

} OPTIONAL, -- Cond SharedSpectrum

discoveryBurstWindowLength-r16 ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5} OPTIONAL, -- Need R

highSpeedConfig-r16 HighSpeedConfig-r16 OPTIONAL -- Need R

]],

[[

channelAccessMode2-r17 ENUMERATED {enabled} OPTIONAL, -- Cond SharedSpectrum2

discoveryBurstWindowLength-v17xy ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot75, ms1, ms1dot25} OPTIONAL -- Need R

]]

}

-- TAG-SERVINGCELLCONFIGCOMMONSIB-STOP

-- ASN1STOP

|  |
| --- |
| ***ServingCellConfigCommonSIB* field descriptions** |
| ***channelAccessMode***  If present, this field indicates which channel access procedures to apply for operation with shared spectrum channel access as defined in TS 37.213 [48]. If the field is configured as "semiStatic", the UE shall apply the channel access procedures for semi-static channel occupancy as described in subclause 4.3 in TS 37.213. If the field is configured as "dynamic"t, the UE shall apply the channel access procedures in TS 37.213, with the exception of subclause 4.3 of TS 37.213. |
| ***channelAccessMode2***  If present (‘enabled’), this field indicates that the UE shall apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE shall not apply any channel access procedure. |
| ***discoveryBurstWindowLength***  Indicates the window length of the discovery burst in ms (see TS 37.213 [48]). The field *discoveryBurstWindowLength-v17xy* is applicable to SCS 480 kHz and SCS 960 kHz. |
| ***groupPresence***  This field is present when maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1. The first/leftmost bit corresponds to the SS/PBCH index 0-7, the second bit corresponds to SS/PBCH block 8-15, and so on. Value 0 in the bitmap indicates that the SSBs according to *inOneGroup* are absent. Value 1 indicates that the SS/PBCH blocks are transmitted in accordance with *inOneGroup*. |
| ***inOneGroup***  When maximum number of SS/PBCH blocks per half frame equals to 4 as defined in TS 38.213 [13], clause 4.1, only the 4 leftmost bits are valid; the UE ignores the 4 rightmost bits. When maximum number of SS/PBCH blocks per half frame equals to 8 as defined in TS 38.213 [13], clause 4.1, all 8 bits are valid. The first/ leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. When maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1, all 8 bit are valid; The first/ leftmost bit corresponds to the first SS/PBCH block index in the group (i.e., to SSB index 0, 8, and so on); the second bit corresponds to the second SS/PBCH block index in the group (i.e., to SSB index 1, 9, and so on), and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not transmitted while value 1 indicates that the corresponding SS/PBCH block is transmitted. |
| ***n-TimingAdvanceOffset***  The N\_TA-Offset to be applied for random access on this serving cell. If the field is absent, the UE applies the value defined for the duplex mode and frequency range of this serving cell. See TS 38.133 [14], table 7.1.2-2. |
| ***ssb-PositionsInBurst***  Time domain positions of the transmitted SS-blocks in an SS-burst as defined in TS 38.213 [13], clause 4.1.  For operation with shared spectrum channel access in FR1, only *inOneGroup* is used and the UE interprets this field same as *mediumBitmap* in *ServingCellConfigCommon*. The UE assumes that a bit in *inOneGroup* at position k > is 0, where is obtained from *MIB* as specified in TS 38.213 [13], clause 4.1. For operation with shared spectrum channel access in FR2-2, the m-th bit in *groupPresence* is set to 0 for m > /8, where is obtained from *MIB* as specified in TS 38.213 [13], clause 4.1. |
| ***ss-PBCH-BlockPower***  Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *FR2-Only* | This field is mandatory present for an FR2 carrier frequency. It is absent otherwise and UE releases any configured value. |
| *SharedSpectrum* | This field is mandatory present if this cell operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R. |
| *SharedSpectrum2* | This field is optionally present if this cell operates with shared spectrum channel access in FR2-2. Otherwise, it is absent, Need R. |
| *TDD* | The field is optionally present, Need R, for TDD cells; otherwise it is absent. |

< Unmodified parts omitted >

– *SPS-Config*

The IE *SPS-Config* is used to configure downlink semi-persistent transmission. Multiple Downlink SPS configurations may be configured in one BWP of a serving cell.

***SPS-Config* information element**

-- ASN1START

-- TAG-SPS-CONFIG-START

SPS-Config ::= SEQUENCE {

periodicity ENUMERATED {ms10, ms20, ms32, ms40, ms64, ms80, ms128, ms160, ms320, ms640,

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

nrofHARQ-Processes INTEGER (1..8),

n1PUCCH-AN PUCCH-ResourceId OPTIONAL, -- Need M

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

...,

[[

sps-ConfigIndex-r16 SPS-ConfigIndex-r16 OPTIONAL, -- Cond SPS-List

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

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

harq-CodebookID-r16 INTEGER (1..2) OPTIONAL, -- Need R

pdsch-AggregationFactor-r16 ENUMERATED {n1, n2, n4, n8 } OPTIONAL -- Need S

]],

[[

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

]]

}

-- TAG-SPS-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SPS-Config* field descriptions** |
| ***harq-CodebookID***  Indicates the HARQ-ACK codebook index for the corresponding HARQ-ACK codebook for SPS PDSCH and ACK for SPS PDSCH release. |
| ***harq-ProcID-Offset***  Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.3.1. |
| ***mcs-Table***  Indicates the MCS table the UE shall use for DL SPS (see TS 38.214 [19],clause 5.1.3.1. If present, the UE shall use the MCS table of low-SE 64QAM table indicated in Table 5.1.3.1-3 of TS 38.214 [19]. If this field is absent and field mcs-table in PDSCH-Config is set to 'qam256' and the activating DCI is of format 1\_1, the UE applies the 256QAM table indicated in Table 5.1.3.1-2 of TS 38.214 [19]. Otherwise, the UE applies the non-low-SE 64QAM table indicated in Table 5.1.3.1-1 of TS 38.214 [19]. |
| ***n1PUCCH-AN***  HARQ resource for PUCCH for DL SPS. The network configures the resource either as format0 or format1. The actual *PUCCH-Resource* is configured in *PUCCH-Config* and referred to by its ID. See TS 38.213 [13], clause 9.2.3. |
| ***nrofHARQ-Processes***  Number of configured HARQ processes for SPS DL (see TS 38.321 [3], clause 5.8.1). |
| ***pdsch-AggregationFactor***  Number of repetitions for SPS PDSCH (see TS 38.214 [19], clause 5.1.2.1). When the field is absent, the UE applies PDSCH aggregation factor of PDSCH-Config. |
| ***periodicity***  Periodicity for DL SPS (see TS 38.214 [19] and TS 38.321 [3], clause 5.8.1). |
| ***periodicityExt***  This field is used to calculate the periodicity for DL SPS (see TS 38.214 [19] and see TS 38.321 [3], clause 5,8.1). If this field is present, the field *periodicity* is ignored.  The following periodicities are supported depending on the configured subcarrier spacing [ms]:  15 kHz: *periodicityExt*, where *periodicityExt* has a value between 1 and 640.  30 kHz: 0.5 x *periodicityExt*, where *periodicityExt* has a value between 1 and 1280.  60 kHz with normal CP. 0.25 x *periodicityExt*, where *periodicityExt* has a value between 1 and 2560.  60 kHz with ECP: 0.25 x *periodicityExt*, where *periodicityExt* has a value between 1 and 2560.  120 kHz: 0.125 x *periodicityExt*, where *periodicityExt* has a value between 1 and 5120.  480 kHz: 0.0625 x *periodicityExt*, where *periodicityExt* has a value between 1 and 20480.  960 kHz: 0.03125 x *periodicityExt*, where *periodicityExt* has a value between 1 and 40960. |
| ***sps-ConfigIndex***  Indicates the index of one of multiple SPS configurations. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *SPS-List* | The field is mandatory present when included in *sps-ConfigToAddModList-r16*, otherwise the field is absent. |

< Unmodified parts omitted >

– *SRS-Config*

The IE *SRS-Config* is used to configure sounding reference signal transmissions. The configuration defines a list of SRS-Resources, a list of SRS-PosResources, a list of SRS-PosResourceSets and a list of SRS-ResourceSets. Each resource set defines a set of SRS-Resources or SRS-PosResources. The network triggers the transmission of the set of SRS-Resources or SRS-PosResources using a configured aperiodicSRS-ResourceTrigger (L1 DCI).

***SRS-Config* information element**

-- ASN1START

-- TAG-SRS-CONFIG-START

SRS-Config ::= SEQUENCE {

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

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

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

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

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

...,

[[

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

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

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

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

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

OPTIONAL, -- Need N

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

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

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

]]

}

SRS-ResourceSet ::= SEQUENCE {

srs-ResourceSetId SRS-ResourceSetId,

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

resourceType CHOICE {

aperiodic SEQUENCE {

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

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

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

...,

[[

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

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

]]

},

semi-persistent SEQUENCE {

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

...

},

periodic SEQUENCE {

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

...

}

},

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

alpha Alpha OPTIONAL, -- Need S

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

pathlossReferenceRS PathlossReferenceRS-Config OPTIONAL, -- Need M

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

...,

[[

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

]]

}

PathlossReferenceRS-Config ::= CHOICE {

ssb-Index SSB-Index,

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

}

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

PathlossReferenceRS-r16 ::= SEQUENCE {

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

pathlossReferenceRS-r16 PathlossReferenceRS-Config

}

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

SRS-PosResourceSet-r16 ::= SEQUENCE {

srs-PosResourceSetId-r16 SRS-PosResourceSetId-r16,

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

OPTIONAL, -- Cond Setup

resourceType-r16 CHOICE {

aperiodic-r16 SEQUENCE {

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

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

...

},

semi-persistent-r16 SEQUENCE {

...

},

periodic-r16 SEQUENCE {

...

}

},

alpha-r16 Alpha OPTIONAL, -- Need S

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

pathlossReferenceRS-Pos-r16 CHOICE {

ssb-IndexServing-r16 SSB-Index,

ssb-Ncell-r16 SSB-InfoNcell-r16,

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

} OPTIONAL, -- Need M

...

}

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

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

SRS-Resource ::= SEQUENCE {

srs-ResourceId SRS-ResourceId,

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

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

transmissionComb CHOICE {

n2 SEQUENCE {

combOffset-n2 INTEGER (0..1),

cyclicShift-n2 INTEGER (0..7)

},

n4 SEQUENCE {

combOffset-n4 INTEGER (0..3),

cyclicShift-n4 INTEGER (0..11)

}

},

resourceMapping SEQUENCE {

startPosition INTEGER (0..5),

nrofSymbols ENUMERATED {n1, n2, n4},

repetitionFactor ENUMERATED {n1, n2, n4}

},

freqDomainPosition INTEGER (0..67),

freqDomainShift INTEGER (0..268),

freqHopping SEQUENCE {

c-SRS INTEGER (0..63),

b-SRS INTEGER (0..3),

b-hop INTEGER (0..3)

},

groupOrSequenceHopping ENUMERATED { neither, groupHopping, sequenceHopping },

resourceType CHOICE {

aperiodic SEQUENCE {

...

},

semi-persistent SEQUENCE {

periodicityAndOffset-sp SRS-PeriodicityAndOffset,

...

},

periodic SEQUENCE {

periodicityAndOffset-p SRS-PeriodicityAndOffset,

...

}

},

sequenceId INTEGER (0..1023),

spatialRelationInfo SRS-SpatialRelationInfo OPTIONAL, -- Need R

...,

[[

resourceMapping-r16 SEQUENCE {

startPosition-r16 INTEGER (0..13),

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

repetitionFactor-r16 ENUMERATED {n1, n2, n4}

} OPTIONAL -- Need R

]]

}

SRS-PosResource-r16::= SEQUENCE {

srs-PosResourceId-r16 SRS-PosResourceId-r16,

transmissionComb-r16 CHOICE {

n2-r16 SEQUENCE {

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

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

},

n4-r16 SEQUENCE {

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

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

},

n8-r16 SEQUENCE {

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

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

},

...

},

resourceMapping-r16 SEQUENCE {

startPosition-r16 INTEGER (0..13),

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

},

freqDomainShift-r16 INTEGER (0..268),

freqHopping-r16 SEQUENCE {

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

...

},

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

resourceType-r16 CHOICE {

aperiodic-r16 SEQUENCE {

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

...

},

semi-persistent-r16 SEQUENCE {

periodicityAndOffset-sp-r16 SRS-PeriodicityAndOffset-r16,

...

},

periodic-r16 SEQUENCE {

periodicityAndOffset-p-r16 SRS-PeriodicityAndOffset-r16,

...

}

},

sequenceId-r16 INTEGER (0..65535),

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

...

}

SRS-SpatialRelationInfo ::= SEQUENCE {

servingCellId ServCellIndex OPTIONAL, -- Need S

referenceSignal CHOICE {

ssb-Index SSB-Index,

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

srs SEQUENCE {

resourceId SRS-ResourceId,

uplinkBWP BWP-Id

}

}

}

SRS-SpatialRelationInfoPos-r16 ::= CHOICE {

servingRS-r16 SEQUENCE {

servingCellId ServCellIndex OPTIONAL, -- Need S

referenceSignal-r16 CHOICE {

ssb-IndexServing-r16 SSB-Index,

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

srs-SpatialRelation-r16 SEQUENCE {

resourceSelection-r16 CHOICE {

srs-ResourceId-r16 SRS-ResourceId,

srs-PosResourceId-r16 SRS-PosResourceId-r16

},

uplinkBWP-r16 BWP-Id

}

}

},

ssb-Ncell-r16 SSB-InfoNcell-r16,

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

}

SSB-Configuration-r16 ::= SEQUENCE {

ssb-Freq-r16 ARFCN-ValueNR,

halfFrameIndex-r16 ENUMERATED {zero, one},

ssbSubcarrierSpacing-r16 SubcarrierSpacing,

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

sfn0-Offset-r16 SEQUENCE {

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

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

} OPTIONAL, -- Need R

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

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

}

SSB-InfoNcell-r16 ::= SEQUENCE {

physicalCellId-r16 PhysCellId,

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

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

}

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

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

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

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

}

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

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

SRS-PeriodicityAndOffset ::= CHOICE {

sl1 NULL,

sl2 INTEGER(0..1),

sl4 INTEGER(0..3),

sl5 INTEGER(0..4),

sl8 INTEGER(0..7),

sl10 INTEGER(0..9),

sl16 INTEGER(0..15),

sl20 INTEGER(0..19),

sl32 INTEGER(0..31),

sl40 INTEGER(0..39),

sl64 INTEGER(0..63),

sl80 INTEGER(0..79),

sl160 INTEGER(0..159),

sl320 INTEGER(0..319),

sl640 INTEGER(0..639),

sl1280 INTEGER(0..1279),

sl2560 INTEGER(0..2559)

}

SRS-PeriodicityAndOffset-r16 ::= CHOICE {

sl1 NULL,

sl2 INTEGER(0..1),

sl4 INTEGER(0..3),

sl5 INTEGER(0..4),

sl8 INTEGER(0..7),

sl10 INTEGER(0..9),

sl16 INTEGER(0..15),

sl20 INTEGER(0..19),

sl32 INTEGER(0..31),

sl40 INTEGER(0..39),

sl64 INTEGER(0..63),

sl80 INTEGER(0..79),

sl160 INTEGER(0..159),

sl320 INTEGER(0..319),

sl640 INTEGER(0..639),

sl1280 INTEGER(0..1279),

sl2560 INTEGER(0..2559),

sl5120 INTEGER(0..5119),

sl10240 INTEGER(0..10239),

sl40960 INTEGER(0..40959),

sl81920 INTEGER(0..81919),

...

}

-- TAG-SRS-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SRS-Config* field descriptions** |
| ***tpc-Accumulation***  If the field is absent, UE applies TPC commands via accumulation. If disabled, UE applies the TPC command without accumulation (this applies to SRS when a separate closed loop is configured for SRS) (see TS 38.213 [13], clause 7.3). |

|  |
| --- |
| ***SRS-Resource, SRS-PosResource* field descriptions** |
| ***cyclicShift-n2***  Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***cyclicShift-n4***  Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***freqHopping***  Includes parameters capturing SRS frequency hopping (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, the network always configures this field such that *b-hop* > *b-SRS*. |
| ***groupOrSequenceHopping***  Parameter(s) for configuring group or sequence hopping (see TS 38.211 [16], clause 6.4.1.4.2). For CLI SRS-RSRP measurement, the network always configures this parameter to 'neither'. |
| ***nrofSRS-Ports***  Number of ports. For CLI SRS-RSRP measurement, the network always configures this parameter to 'port1'. |
| ***periodicityAndOffset-p***  Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, *sl1280* and *sl2560* cannot be configured. |
| ***periodicityAndOffset-sp***  Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). |
| ***ptrs-PortIndex***  The PTRS port index for this SRS resource for non-codebook based UL MIMO. This is only applicable when the corresponding *PTRS-UplinkConfig* is set to CP-OFDM. The *ptrs-PortIndex* configured here must be smaller than the *maxNrofPorts* configured in the *PTRS-UplinkConfig* (see TS 38.214 [19], clause 6.2.3.1). This parameter is not applicable to CLI SRS-RSRP measurement. |
| ***resourceMapping***  OFDM symbol location of the SRS resource within a slot including *nrofSymbols* (number of OFDM symbols), *startPosition* (value 0 refers to the last symbol, value 1 refers to the second last symbol, and so on) and *repetitionFactor* (see TS 38.214 [19], clause 6.2.1 and TS 38.211 [16], clause 6.4.1.4). The configured SRS resource does not exceed the slot boundary. If *resourceMapping-r16* is signalled, UE shall ignore the *resourceMapping* (without suffix). For CLI SRS-RSRP measurement, the network always configures *nrofSymbols* and *repetitionFactor* to 'n1'. |
| ***resourceType***  Periodicity and offset for semi-persistent and periodic SRS resource (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, only 'periodic' is applicable for *resourceType*. |
| ***sequenceId***  Sequence ID used to initialize pseudo random group and sequence hopping (see TS 38.214 [19], clause 6.2.1). |
| ***servingCellId***  The serving Cell ID of the source SSB, CSI-RS, or SRS for the spatial relation of the target SRS resource. If this field is absent the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured. |
| ***spatialRelationInfo***  Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS (see TS 38.214 [19], clause 6.2.1). This parameter is not applicable to CLI SRS-RSRP measurement. |
| ***spatialRelationInfoPos***  Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS (see TS 38.214 [19], clause 6.2.1).  If the IE *srs-ResourceId-Ext* is present, the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 63. Otherwise the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 31. |
| ***srs-RequestDCI-0-2***  Indicate the number of bits for "SRS request"in DCI format 0\_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 0\_2 is applied. If the parameter *srs-RequestDCI-0-2* is configured to value 1, 1 bit is used to indicate one of the first two rows of Table 7.3.1.1.2-24 in TS 38.212 [17] for triggered aperiodic SRS resource set. If the value 2 is configured, 2 bits are used to indicate one of the rows of Table 7.3.1.1.2-24 in TS 38.212 [17]. When UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication. |
| ***srs-RequestDCI-1-2***  Indicate the number of bits for "SRS request" in DCI format 1\_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 1\_2 is applied. When the UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication (see TS 38.214 [19], clause 6.1.1.2). |
| ***srs-ResourceSetToAddModListDCI-0-2***  List of SRS resource set to be added or modified for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***srs-ResourceSetToReleaseListDCI-0-2***  List of SRS resource set to be released for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***transmissionComb***  Comb value (2 or 4 or 8) and comb offset (0..combValue-1) (see TS 38.214 [19], clause 6.2.1). |

|  |
| --- |
| ***SRS-ResourceSet, SRS-PosResourceSet* field descriptions** |
| ***alpha***  alpha value for SRS power control (see TS 38.213 [13], clause 7.3). When the field is absent the UE applies the value 1. |
| ***aperiodicSRS-ResourceTriggerList***  An additional list of DCI "code points" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6). When the field is not included during a reconfiguration of *SRS-ResourceSet* of *resourceType* set to *aperiodic*, UE maintains this value based on the Need M; that is, this list is not considered as an extension of *aperiodicSRS-ResourceTrigger* for purpose of applying the general rule for extended list in clause 6.1.3. |
| ***aperiodicSRS-ResourceTrigger***  The DCI "code point" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6). |
| ***associatedCSI-RS***  ID of CSI-RS resource associated with this SRS resource set in non-codebook based operation (see TS 38.214 [19], clause 6.1.1.2). |
| ***csi-RS***  ID of CSI-RS resource associated with this SRS resource set. (see TS 38.214 [19], clause 6.1.1.2). |
| ***csi-RS-IndexServingcell***  Indicates CSI-RS index belonging to a serving cell |
| ***p0***  P0 value for SRS power control. The value is in dBm. Only even values (step size 2) are allowed (see TS 38.213 [13], clause 7.3). |
| ***pathlossReferenceRS***  A reference signal (e.g. a CSI-RS config or a SS block) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). |
| ***pathlossReferenceRS-Pos***  A reference signal (e.g. a SS block or a DL-PRS config) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). |
| ***pathlossReferenceRSList***  Multiple candidate pathloss reference RS(s) for SRS power control, where one candidate RS can be mapped to SRS Resource Set via MAC CE (clause 6.1.3.27 in TS 38.321 [3]). The network can only configure this field if *pathlossReferenceRS* is not configured in the same *SRS-ResourceSet*. |
| ***resourceSelection***  Indicates whether the configured SRS spatial relation resource is a *SRS-Resource* or *SRS-PosResource*. |
| ***resourceType***  Time domain behavior of SRS resource configuration, see TS 38.214 [19], clause 6.2.1. The network configures SRS resources in the same resource set with the same time domain behavior on periodic, aperiodic and semi-persistent SRS. |
| ***slotOffset***  An offset in number of slots between the triggering DCI and the actual transmission of this *SRS-ResourceSet*. If the field is absent the UE applies no offset (value 0). |
| ***srs-PowerControlAdjustmentStates***  Indicates whether hsrs,c(i) = fc(i,1) or hsrs,c(i) = fc(i,2) (if twoPUSCH-PC-AdjustmentStates are configured) or separate close loop is configured for SRS. This parameter is applicable only for Uls on which UE also transmits PUSCH. If absent or release, the UE applies the value sameAs-Fci1 (see TS 38.213 [13], clause 7.3). |
| ***srs-ResourceIdList, srs-PosResourceIdList***  The IDs of the SRS-Resources/SRS-PosResource used in this *SRS-ResourceSet/SRS-PosResourceSet*. If this *SRS-ResourceSet/SRS-PosResourceSet* is configured with usage set to codebook, the *srs-ResourceIdList/srs-PosResourceIdList* contains at most 2 entries. If this *SRS-ResourceSet/SRS-PosResourceSet* is configured with *usage* set to *nonCodebook*, the *srs-ResourceIdList/srs-PosResourceIdList* contains at most 4 entries. |
| ***srs-ResourceSetId, srs-PosResourceSetId***  The ID of this resource set. It is unique in the context of the BWP in which the parent *SRS-Config* is defined. |
| ***ssb-IndexSevingcell***  Indicates SSB index belonging to a serving cell |
| ***ssb-NCell***  This field indicates a SSB configuration from neighboring cell |
| ***usage***  Indicates if the SRS resource set is used for beam management, codebook based or non-codebook based transmission or antenna switching. See TS 38.214 [19], clause 6.2.1. Reconfiguration between codebook based and non-codebook based transmission is not supported. |

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

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

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| --- |
| ***SSB-Configuration* field descriptions** |
| ***halfFrameIndex***  Indicates whether SSB is in the first half or the second half of the frame.Value zero indicates the first half and value 1 indicates the second half. |
| ***integerSubframeOffset***  Indicates the subframe boundary offset of the cell in which SSB is transmited. |
| ***sfn0-Offset***  Indiactes the time offset of the SFN0 slot 0 for the cell with respect to SFN0 slot 0 of serving cell. |
| ***sfn-Offset***  Specifies the SFN offset between the cell in which SSB is transmited and serving cell. The offset corresponds to the number of full radio frames counted from the beginning of a radio frame #0 of serving cell to the beginning of the closest subsequent radio frame #0 of the cell in which SSB is transmitted. |
| ***sfn-SSB-Offset***  Indicates the SFN offset of the transmitted SSB relative to the start of the SSB period. Value 0 indicates that the SSB is transmitted in the first system frame, value 1 indicates that SSB is transmitted in the second system frame and so on. The network configures this field according to the field *ssb-Periodicity* such that the indicated system frame does not exceed the configured SSB periodicity. |
| ***ssb-Freq***  Indicates the frequency of the SSB. |
| ***ssb-PBCH-BlockPower***  Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7. |
| ***ssb-Periodicity***  Indicates the periodicity of the SSB. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1) |
| ***ssbSubcarrierSpacing***  Subcarrier spacing of SSB.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |

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

< Unmodified parts omitted >

– *SubcarrierSpacing*

The IE *SubcarrierSpacing* determines the subcarrier spacing. Restrictions applicable for certain frequencies, channels or signals are clarified in the fields that use this IE.

***SubcarrierSpacing* information element**

-- ASN1START

-- TAG-SUBCARRIERSPACING-START

SubcarrierSpacing ::= ENUMERATED {kHz15, kHz30, kHz60, kHz120, kHz240, kHz480-v17xy, kHz960-v17xy, spare1}

-- TAG-SUBCARRIERSPACING-STOP

-- ASN1STOP

– *TDD-UL-DL-ConfigCommon*

The IE *TDD-UL-DL-ConfigCommon* determines the cell specific Uplink/Downlink TDD configuration.

***TDD-UL-DL-ConfigCommon* information element**

-- ASN1START

-- TAG-TDD-UL-DL-CONFIGCOMMON-START

TDD-UL-DL-ConfigCommon ::= SEQUENCE {

referenceSubcarrierSpacing SubcarrierSpacing,

pattern1 TDD-UL-DL-Pattern,

pattern2 TDD-UL-DL-Pattern OPTIONAL, -- Need R

...

}

TDD-UL-DL-Pattern ::= SEQUENCE {

dl-UL-TransmissionPeriodicity ENUMERATED {ms0p5, ms0p625, ms1, ms1p25, ms2, ms2p5, ms5, ms10},

nrofDownlinkSlots INTEGER (0..maxNrofSlots),

nrofDownlinkSymbols INTEGER (0..maxNrofSymbols-1),

nrofUplinkSlots INTEGER (0..maxNrofSlots),

nrofUplinkSymbols INTEGER (0..maxNrofSymbols-1),

...,

[[

dl-UL-TransmissionPeriodicity-v1530 ENUMERATED {ms3, ms4} OPTIONAL -- Need R

]]

}

-- TAG-TDD-UL-DL-CONFIGCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| ***TDD-UL-DL-ConfigCommon* field descriptions** |
| ***referenceSubcarrierSpacing***  Reference SCS used to determine the time domain boundaries in the UL-DL pattern which must be common across all subcarrier specific carriers, i.e., independent of the actual subcarrier spacing using for data transmission.  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  The network configures a not larger than any SCS of configured BWPs for the serving cell. The network or *SL-PreconfigGeneral* configures a not larger than the SCS of (pre-)configured SL BWP.See TS 38.213 [13], clause 11.1. |

|  |
| --- |
| ***TDD-UL-DL-Pattern* field descriptions** |
| ***dl-UL-TransmissionPeriodicity***  Periodicity of the DL-UL pattern, see TS 38.213 [13], clause 11.1. If the *dl-UL-TransmissionPeriodicity-v1530* is signalled, UE shall ignore the *dl-UL-TransmissionPeriodicity* (without suffix). |
| ***nrofDownlinkSlots***  Number of consecutive full DL slots at the beginning of each DL-UL pattern, see TS 38.213 [13], clause 11.1. In this release, the maximum value for this field is 80. |
| ***nrofDownlinkSymbols***  Number of consecutive DL symbols in the beginning of the slot following the last full DL slot (as derived from *nrofDownlinkSlots*). The value 0 indicates that there is no partial-downlink slot. (see TS 38.213 [13], clause 11.1). |
| ***nrofUplinkSlots***  Number of consecutive full UL slots at the end of each DL-UL pattern, see TS 38.213 [13], clause 11.1. In this release, the maximum value for this field is 80. |
| ***nrofUplinkSymbols***  Number of consecutive UL symbols in the end of the slot preceding the first full UL slot (as derived from *nrofUplinkSlots*). The value 0 indicates that there is no partial-uplink slot. (see TS 38.213 [13], clause 11.1). |

< Unmodified parts omitted >

6.3.4 Other information elements

< Unmodified parts omitted >

– *OtherConfig*

The IE *OtherConfig* contains configuration related to miscellaneous other configurations.

***OtherConfig* information element**

-- ASN1START

-- TAG-OTHERCONFIG-START

OtherConfig ::= SEQUENCE {

delayBudgetReportingConfig CHOICE{

release NULL,

setup SEQUENCE{

delayBudgetReportingProhibitTimer ENUMERATED {s0, s0dot4, s0dot8, s1dot6, s3, s6, s12, s30}

}

} OPTIONAL -- Need M

}

OtherConfig-v1540 ::= SEQUENCE {

overheatingAssistanceConfig SetupRelease {OverheatingAssistanceConfig} OPTIONAL, -- Need M

...

}

CandidateServingFreqListNR-r16 ::= SEQUENCE (SIZE (1..maxFreqIDC-r16)) OF ARFCN-ValueNR

OtherConfig-v1610 ::= SEQUENCE {

idc-AssistanceConfig-r16 SetupRelease {IDC-AssistanceConfig-r16} OPTIONAL, -- Need M

drx-PreferenceConfig-r16 SetupRelease {DRX-PreferenceConfig-r16} OPTIONAL, -- Need M

maxBW-PreferenceConfig-r16 SetupRelease {MaxBW-PreferenceConfig-r16} OPTIONAL, -- Need M

maxCC-PreferenceConfig-r16 SetupRelease {MaxCC-PreferenceConfig-r16} OPTIONAL, -- Need M

maxMIMO-LayerPreferenceConfig-r16 SetupRelease {MaxMIMO-LayerPreferenceConfig-r16} OPTIONAL, -- Need M

minSchedulingOffsetPreferenceConfig-r16 SetupRelease {MinSchedulingOffsetPreferenceConfig-r16} OPTIONAL, -- Need M

releasePreferenceConfig-r16 SetupRelease {ReleasePreferenceConfig-r16} OPTIONAL, -- Need M

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

btNameList-r16 SetupRelease {BT-NameList-r16} OPTIONAL, -- Need M

wlanNameList-r16 SetupRelease {WLAN-NameList-r16} OPTIONAL, -- Need M

sensorNameList-r16 SetupRelease {Sensor-NameList-r16} OPTIONAL, -- Need M

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

sl-AssistanceConfigNR-r16 ENUMERATED{true} OPTIONAL -- Need R

}

OtherConfig-v17xy ::= SEQUENCE {

maxBW-PreferenceConfigFR2-2-r17 ENUMERATED {true} OPTIONAL, -- Cond maxBW

maxMIMO-LayerPreferenceConfigFR2-2-r17 ENUMERATED {true} OPTIONAL, -- Cond maxMIMO

minSchedulingOffsetPreferenceConfigExt-r17 ENUMERATED {true} OPTIONAL -- Cond minOffset

}

OverheatingAssistanceConfig ::= SEQUENCE {

overheatingIndicationProhibitTimer ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,

s60, s90, s120, s300, s600, spare3, spare2, spare1}

}

IDC-AssistanceConfig-r16 ::= SEQUENCE {

candidateServingFreqListNR-r16 CandidateServingFreqListNR-r16 OPTIONAL, -- Need R

...

}

DRX-PreferenceConfig-r16 ::= SEQUENCE {

drx-PreferenceProhibitTimer-r16 ENUMERATED {

s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,

s8, s9, s10, s20, s30, spare2, spare1}

}

MaxBW-PreferenceConfig-r16 ::= SEQUENCE {

maxBW-PreferenceProhibitTimer-r16 ENUMERATED {

s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,

s8, s9, s10, s20, s30, spare2, spare1}

}

MaxCC-PreferenceConfig-r16 ::= SEQUENCE {

maxCC-PreferenceProhibitTimer-r16 ENUMERATED {

s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,

s8, s9, s10, s20, s30, spare2, spare1}

}

MaxMIMO-LayerPreferenceConfig-r16 ::= SEQUENCE {

maxMIMO-LayerPreferenceProhibitTimer-r16 ENUMERATED {

s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,

s8, s9, s10, s20, s30, spare2, spare1}

}

MinSchedulingOffsetPreferenceConfig-r16 ::= SEQUENCE {

minSchedulingOffsetPreferenceProhibitTimer-r16 ENUMERATED {

s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,

s8, s9, s10, s20, s30, spare2, spare1}

}

ReleasePreferenceConfig-r16 ::= SEQUENCE {

releasePreferenceProhibitTimer-r16 ENUMERATED {

s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,

s8, s9, s10, s20, s30, infinity, spare1},

connectedReporting ENUMERATED {true} OPTIONAL -- Need R

}

-- TAG-OTHERCONFIG-STOP

-- ASN1STOP

| ***OtherConfig* field descriptions** |
| --- |
| ***candidateServingFreqListNR***  Indicates for each candidate NR serving cells, the center frequency around which UE is requested to report IDC issues. |
| ***connectedReporting***  Indicates that the UE can report a preference to remain in RRC\_CONNECTED state following a report to leave RRC\_CONNECTED state. If absent, the UE cannot report a preference to stay in RRC\_CONNECTED state. |
| ***delayBudgetReportingProhibitTimer***  Prohibit timer for delay budget reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot4* means prohibit timer is set to 0.4 seconds, and so on. |
| ***drx-PreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's DRX preferences for power saving. |
| ***drx-PreferenceProhibitTimer***  Prohibit timer for DRX preferences assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***idc-AssistanceConfig***  Configuration for the UE to report assistance information to inform the gNB about UE detected IDC problem. |
| ***maxBW-PreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred bandwidth for power saving. |
| ***maxBW-PreferenceConfigFR2-2***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred bandwidth for power saving for FR2-2. |
| ***maxBW-PreferenceProhibitTimer***  Prohibit timer for preferred bandwidth assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***maxCC-PreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of carriers for power saving. |
| ***maxCC-PreferenceProhibitTimer***  Prohibit timer for preferred number of carriers assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***maxMIMO-LayerPreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of MIMO layers for power saving. |
| ***maxMIMO-LayerPreferenceConfigFR2-2***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of MIMO layers for power saving for FR2-2. |
| ***maxMIMO-LayerPreferenceProhibitTimer***  Prohibit timer for preferred number of number of MIMO layers assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***minSchedulingOffsetPreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred *minimumSchedulingOffset* value for cross-slot scheduling for power saving. |
| ***minSchedulingOffsetPreferenceConfigExt***  Configuration for the UE to report assistance information to inform the gNB about the UE’s preferred *minimumSchedulingOffset* value for cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz. |
| ***candidateServingFreqListNR***  Indicates for each candidate NR serving cells, the center frequency around which UE is requested to report IDC issues. |
| ***connectedReporting***  Indicates that the UE can report a preference to remain in RRC\_CONNECTED state following a report to leave RRC\_CONNECTED state. If absent, the UE cannot report a preference to stay in RRC\_CONNECTED state. |
| ***delayBudgetReportingProhibitTimer***  Prohibit timer for delay budget reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot4* means prohibit timer is set to 0.4 seconds, and so on. |
| ***drx-PreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's DRX preferences for power saving. |
| ***drx-PreferenceProhibitTimer***  Prohibit timer for DRX preferences assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***idc-AssistanceConfig***  Configuration for the UE to report assistance information to inform the gNB about UE detected IDC problem. |
| ***maxBW-PreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred bandwidth for power saving. |
| ***maxBW-PreferenceProhibitTimer***  Prohibit timer for preferred bandwidth assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***maxCC-PreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of carriers for power saving. |
| ***maxCC-PreferenceProhibitTimer***  Prohibit timer for preferred number of carriers assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***maxMIMO-LayerPreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of MIMO layers for power saving. |
| ***maxMIMO-LayerPreferenceProhibitTimer***  Prohibit timer for preferred number of number of MIMO layers assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***minSchedulingOffsetPreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preferred *minimumSchedulingOffset* value for cross-slot scheduling for power saving. |
| ***minSchedulingOffsetPreferenceProhibitTimer***  Prohibit timer for preferred *minimumSchedulingOffset* assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***obtainCommonLocation***  Requests the UE to attempt to have detailed location information available using GNSS. NR configures the field if *includeCommonLocationInfo* is configured for one or more measurements. |
| ***overheatingAssistanceConfig***  Configuration for the UE to report assistance information to inform the gNB about UE detected internal overheating. |
| ***overheatingIndicationProhibitTimer***  Prohibit timer for overheating assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. |
| ***referenceTimePreferenceReporting***  If present, the field indicates the UE is configured to provide reference time assistance information. |
| ***releasePreferenceConfig***  Configuration for the UE to report assistance information to inform the gNB about the UE's preference to leave RRC\_CONNECTED state. |
| ***releasePreferenceProhibitTimer***  Prohibit timer for release preference assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. Value *infinity* means that once a UE has reported a release preference, the UE cannot report a release preference again during the RRC connection. |
| ***sensorNameList***  Configuration for the UE to report measurements from specific sensors. |
| ***sl-AssistanceConfigNR***  Indicate whether UE is configured to provide configured grant assistance information for NR sidelink communication. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *maxBW* | This field is optionally present, need R, if *maxBW-PreferenceConfig-r16* is setup; otherwise it is absent, need R. |
| *maxMIMO* | This field is optionally present, need R, if *maxMIMO-LayerPreferenceConfig-r16* is setup; otherwise it is absent, need R. |
| *minOffset* | This field is optionally present, need R, if *minSchedulingOffsetPreferenceConfig-r16* is setup; otherwise it is absent, need R. |

< Unmodified parts omitted >

6.4 RRC multiplicity and type constraint values

– Multiplicity and type constraint definitions

-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-START

maxAI-DCI-PayloadSize-r16 INTEGER ::= 128 --Maximum size of the DCI payload scrambled with ai-RNTI

maxAI-DCI-PayloadSize-1-r16 INTEGER ::= 127 --Maximum size of the DCI payload scrambled with ai-RNTI minus 1

maxBandComb INTEGER ::= 65536 -- Maximum number of DL band combinations

maxBandsUTRA-FDD-r16 INTEGER ::= 64 -- Maximum number of bands listed in UTRA-FDD UE caps

maxBH-RLC-ChannelID-r16 INTEGER ::= 65536 -- Maximum value of BH RLC Channel ID

maxBT-IdReport-r16 INTEGER ::= 32 -- Maximum number of Bluetooth IDs to report

maxBT-Name-r16 INTEGER ::= 4 -- Maximum number of Bluetooth name

maxCAG-Cell-r16 INTEGER ::= 16 -- Maximum number of NR CAG cell ranges in SIB3, SIB4

maxTwoPUCCH-Grp-ConfigList-r16 INTEGER ::= 32 -- Maximum number of supported configuration(s) of {primary PUCCH group

-- config, secondary PUCCH group config}

maxCBR-Config-r16 INTEGER ::= 8 -- Maximum number of CBR range configurations for sidelink communication

-- congestion control

maxCBR-Config-1-r16 INTEGER ::= 7 -- Maximum number of CBR range configurations for sidelink communication

-- congestion control minus 1

maxCBR-Level-r16 INTEGER ::= 16 -- Maximum nuber of CBR levels

maxCBR-Level-1-r16 INTEGER ::= 15 -- Maximum number of CBR levels minus 1

maxCellBlack INTEGER ::= 16 -- Maximum number of NR blacklisted cell ranges in SIB3, SIB4

maxCellGroupings-r16 INTEGER ::= 32 -- Maximum number of cell groupings for NR-DC

maxCellHistory-r16 INTEGER ::= 16 -- Maximum number of visited cells reported

maxCellInter INTEGER ::= 16 -- Maximum number of inter-Freq cells listed in SIB4

maxCellIntra INTEGER ::= 16 -- Maximum number of intra-Freq cells listed in SIB3

maxCellMeasEUTRA INTEGER ::= 32 -- Maximum number of cells in E-UTRAN

maxCellMeasIdle-r16 INTEGER ::= 8 -- Maximum number of cells per carrier for idle/inactive measurements

maxCellMeasUTRA-FDD-r16 INTEGER ::= 32 -- Maximum number of cells in FDD UTRAN

maxCellWhite INTEGER ::= 16 -- Maximum number of NR whitelisted cell ranges in SIB3, SIB4

maxEARFCN INTEGER ::= 262143 -- Maximum value of E-UTRA carrier frequency

maxEUTRA-CellBlack INTEGER ::= 16 -- Maximum number of E-UTRA blacklisted physical cell identity ranges

-- in SIB5

maxEUTRA-NS-Pmax INTEGER ::= 8 -- Maximum number of NS and P-Max values per band

maxLogMeasReport-r16 INTEGER ::= 520 -- Maximum number of entries for logged measurements

maxMultiBands INTEGER ::= 8 -- Maximum number of additional frequency bands that a cell belongs to

maxNARFCN INTEGER ::= 3279165 -- Maximum value of NR carrier frequency

maxNR-NS-Pmax INTEGER ::= 8 -- Maximum number of NS and P-Max values per band

maxFreqIdle-r16 INTEGER ::= 8 -- Maximum number of carrier frequencies for idle/inactive measurements

maxNrofServingCells INTEGER ::= 32 -- Max number of serving cells (SpCells + SCells)

maxNrofServingCells-1 INTEGER ::= 31 -- Max number of serving cells (SpCell + SCells) per cell group

maxNrofAggregatedCellsPerCellGroup INTEGER ::= 16

maxNrofAggregatedCellsPerCellGroupMinus4-r16 INTEGER ::= 12

maxNrofDUCells-r16 INTEGER ::= 512 -- Max number of cells configured on the collocated IAB-DU

maxNrofAvailabilityCombinationsPerSet-r16 INTEGER ::= 512 -- Max number of AvailabilityCombinationId used in the DCI format 2\_5

maxNrofAvailabilityCombinationsPerSet-1-r16 INTEGER ::= 511 -- Max number of AvailabilityCombinationId used in the DCI format 2\_5 minus 1

maxNrofSCells INTEGER ::= 31 -- Max number of secondary serving cells per cell group

maxNrofCellMeas INTEGER ::= 32 -- Maximum number of entries in each of the cell lists in a measurement object

maxNrofCG-SL-r16 INTEGER ::= 8 -- Max number of sidelink configured grant

maxNrofCG-SL-1-r16 INTEGER ::= 7 -- Max number of sidelink configured grant minus 1

maxNrofSS-BlocksToAverage INTEGER ::= 16 -- Max number for the (max) number of SS blocks to average to determine cell measurement

maxNrofCondCells-r16 INTEGER ::= 8 -- Max number of conditional candidate SpCells

maxNrofCSI-RS-ResourcesToAverage INTEGER ::= 16 -- Max number for the (max) number of CSI-RS to average to determine cell measurement

maxNrofDL-Allocations INTEGER ::= 16 -- Maximum number of PDSCH time domain resource allocations

maxNrofSR-ConfigPerCellGroup INTEGER ::= 8 -- Maximum number of SR configurations per cell group

maxLCG-ID INTEGER ::= 7 -- Maximum value of LCG ID

maxLC-ID INTEGER ::= 32 -- Maximum value of Logical Channel ID

maxLC-ID-Iab-r16 INTEGER ::= 65855 -- Maximum value of BH Logical Channel ID extension

maxLTE-CRS-Patterns-r16 INTEGER ::= 3 -- Maximum number of additional LTE CRS rate matching patterns

maxNrofTAGs INTEGER ::= 4 -- Maximum number of Timing Advance Groups

maxNrofTAGs-1 INTEGER ::= 3 -- Maximum number of Timing Advance Groups minus 1

maxNrofBWPs INTEGER ::= 4 -- Maximum number of BWPs per serving cell

maxNrofCombIDC INTEGER ::= 128 -- Maximum number of reported MR-DC combinations for IDC

maxNrofSymbols-1 INTEGER ::= 13 -- Maximum index identifying a symbol within a slot (14 symbols, indexed from 0..13)

maxNrofSlots INTEGER ::= 320 -- Maximum number of slots in a 10 ms period

maxNrofSlots-1 INTEGER ::= 319 -- Maximum number of slots in a 10 ms period minus 1

maxNrofPhysicalResourceBlocks INTEGER ::= 275 -- Maximum number of PRBs

maxNrofPhysicalResourceBlocks-1 INTEGER ::= 274 -- Maximum number of PRBs minus 1

maxNrofPhysicalResourceBlocksPlus1 INTEGER ::= 276 -- Maximum number of PRBs plus 1

maxNrofControlResourceSets INTEGER ::= 12 -- Max number of CoReSets configurable on a serving cell

maxNrofControlResourceSets-1 INTEGER ::= 11 -- Max number of CoReSets configurable on a serving cell minus 1

maxNrofControlResourceSets-1-r16 INTEGER ::= 15 -- Max number of CoReSets configurable on a serving cell extended in minus 1

maxNrofCoresetPools-r16 INTEGER ::= 2 -- Maximum number of CORESET pools

maxCoReSetDuration INTEGER ::= 3 -- Max number of OFDM symbols in a control resource set

maxNrofSearchSpaces-1 INTEGER ::= 39 -- Max number of Search Spaces minus 1

maxSFI-DCI-PayloadSize INTEGER ::= 128 -- Max number payload of a DCI scrambled with SFI-RNTI

maxSFI-DCI-PayloadSize-1 INTEGER ::= 127 -- Max number payload of a DCI scrambled with SFI-RNTI minus 1

maxIAB-IP-Address-r16 INTEGER ::= 32 -- Max number of assigned IP addresses

maxINT-DCI-PayloadSize INTEGER ::= 126 -- Max number payload of a DCI scrambled with INT-RNTI

maxINT-DCI-PayloadSize-1 INTEGER ::= 125 -- Max number payload of a DCI scrambled with INT-RNTI minus 1

maxNrofRateMatchPatterns INTEGER ::= 4 -- Max number of rate matching patterns that may be configured

maxNrofRateMatchPatterns-1 INTEGER ::= 3 -- Max number of rate matching patterns that may be configured minus 1

maxNrofRateMatchPatternsPerGroup INTEGER ::= 8 -- Max number of rate matching patterns that may be configured in one group

maxNrofCSI-ReportConfigurations INTEGER ::= 48 -- Maximum number of report configurations

maxNrofCSI-ReportConfigurations-1 INTEGER ::= 47 -- Maximum number of report configurations minus 1

maxNrofCSI-ResourceConfigurations INTEGER ::= 112 -- Maximum number of resource configurations

maxNrofCSI-ResourceConfigurations-1 INTEGER ::= 111 -- Maximum number of resource configurations minus 1

maxNrofAP-CSI-RS-ResourcesPerSet INTEGER ::= 16

maxNrOfCSI-AperiodicTriggers INTEGER ::= 128 -- Maximum number of triggers for aperiodic CSI reporting

maxNrofReportConfigPerAperiodicTrigger INTEGER ::= 16 -- Maximum number of report configurations per trigger state for aperiodic reporting

maxNrofNZP-CSI-RS-Resources INTEGER ::= 192 -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources

maxNrofNZP-CSI-RS-Resources-1 INTEGER ::= 191 -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources minus 1

maxNrofNZP-CSI-RS-ResourcesPerSet INTEGER ::= 64 -- Maximum number of NZP CSI-RS resources per resource set

maxNrofNZP-CSI-RS-ResourceSets INTEGER ::= 64 -- Maximum number of NZP CSI-RS resource sets per cell

maxNrofNZP-CSI-RS-ResourceSets-1 INTEGER ::= 63 -- Maximum number of NZP CSI-RS resource sets per cell minus 1

maxNrofNZP-CSI-RS-ResourceSetsPerConfig INTEGER ::= 16 -- Maximum number of resource sets per resource configuration

maxNrofNZP-CSI-RS-ResourcesPerConfig INTEGER ::= 128 -- Maximum number of resources per resource configuration

maxNrofZP-CSI-RS-Resources INTEGER ::= 32 -- Maximum number of Zero-Power (ZP) CSI-RS resources

maxNrofZP-CSI-RS-Resources-1 INTEGER ::= 31 -- Maximum number of Zero-Power (ZP) CSI-RS resources minus 1

maxNrofZP-CSI-RS-ResourceSets-1 INTEGER ::= 15

maxNrofZP-CSI-RS-ResourcesPerSet INTEGER ::= 16

maxNrofZP-CSI-RS-ResourceSets INTEGER ::= 16

maxNrofCSI-IM-Resources INTEGER ::= 32 -- Maximum number of CSI-IM resources

maxNrofCSI-IM-Resources-1 INTEGER ::= 31 -- Maximum number of CSI-IM resources minus 1

maxNrofCSI-IM-ResourcesPerSet INTEGER ::= 8 -- Maximum number of CSI-IM resources per set

maxNrofCSI-IM-ResourceSets INTEGER ::= 64 -- Maximum number of NZP CSI-IM resource sets per cell

maxNrofCSI-IM-ResourceSets-1 INTEGER ::= 63 -- Maximum number of NZP CSI-IM resource sets per cell minus 1

maxNrofCSI-IM-ResourceSetsPerConfig INTEGER ::= 16 -- Maximum number of CSI IM resource sets per resource configuration

maxNrofCSI-SSB-ResourcePerSet INTEGER ::= 64 -- Maximum number of SSB resources in a resource set

maxNrofCSI-SSB-ResourceSets INTEGER ::= 64 -- Maximum number of CSI SSB resource sets per cell

maxNrofCSI-SSB-ResourceSets-1 INTEGER ::= 63 -- Maximum number of CSI SSB resource sets per cell minus 1

maxNrofCSI-SSB-ResourceSetsPerConfig INTEGER ::= 1 -- Maximum number of CSI SSB resource sets per resource configuration

maxNrofFailureDetectionResources INTEGER ::= 10 -- Maximum number of failure detection resources

maxNrofFailureDetectionResources-1 INTEGER ::= 9 -- Maximum number of failure detection resources minus 1

maxNrofFreqSL-r16 INTEGER ::= 8 -- Maximum number of carrier frequncy for for NR sidelink communication

maxNrofSL-BWPs-r16 INTEGER ::= 4 -- Maximum number of BWP for for NR sidelink communication

maxFreqSL-EUTRA-r16 INTEGER ::= 8 -- Maximum number of EUTRA anchor carrier frequncy for NR sidelink communication

maxNrofSL-MeasId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement identity (RSRP) per destination

maxNrofSL-ObjectId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement objects (RSRP) per destination

maxNrofSL-ReportConfigId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement reporting configuration(RSRP) per destination

maxNrofSL-PoolToMeasureNR-r16 INTEGER ::= 8 -- Maximum number of resoure pool for NR sidelink measurement to measure for

-- each measurement object (for CBR)

maxFreqSL-NR-r16 INTEGER ::= 8 -- Maximum number of NR anchor carrier frequncy for NR sidelink communication

maxNrofSL-QFIs-r16 INTEGER ::= 2048 -- Maximum number of QoS flow for NR sidelink communication per UE

maxNrofSL-QFIsPerDest-r16 INTEGER ::= 64 -- Maximum number of QoS flow per destination for NR sidelink communication

maxNrofObjectId INTEGER ::= 64 -- Maximum number of measurement objects

maxNrofPageRec INTEGER ::= 32 -- Maximum number of page records

maxNrofPCI-Ranges INTEGER ::= 8 -- Maximum number of PCI ranges

maxPLMN INTEGER ::= 12 -- Maximum number of PLMNs broadcast and reported by UE at establisghment

maxNrofCSI-RS-ResourcesRRM INTEGER ::= 96 -- Maximum number of CSI-RS resources per cell for an RRM measurement object

maxNrofCSI-RS-ResourcesRRM-1 INTEGER ::= 95 -- Maximum number of CSI-RS resources per cell for an RRM measurement object minus 1

maxNrofMeasId INTEGER ::= 64 -- Maximum number of configured measurements

maxNrofQuantityConfig INTEGER ::= 2 -- Maximum number of quantity configurations

maxNrofCSI-RS-CellsRRM INTEGER ::= 96 -- Maximum number of cells with CSI-RS resources for an RRM measurement object

maxNrofSL-Dest-r16 INTEGER ::= 32 -- Maximum number of destination for NR sidelink communication

maxNrofSL-Dest-1-r16 INTEGER ::= 31 -- Highest index of destination for NR sidelink communication

maxNrofSLRB-r16 INTEGER ::= 512 -- Maximum number of radio bearer for NR sidelink communication per UE

maxSL-LCID-r16 INTEGER ::= 512 -- Maximum number of RLC bearer for NR sidelink communication per UE

maxSL-SyncConfig-r16 INTEGER ::= 16 -- Maximum number of sidelink Sync configurations

maxNrofRXPool-r16 INTEGER ::= 16 -- Maximum number of Rx resource poolfor NR sidelink communication

maxNrofTXPool-r16 INTEGER ::= 8 -- Maximum number of Tx resourcepoolfor NR sidelink communication

maxNrofPoolID-r16 INTEGER ::= 16 -- Maximum index of resource pool for NR sidelink communication

maxNrofSRS-PathlossReferenceRS-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for SRS power control.

maxNrofSRS-PathlossReferenceRS-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for SRS power control-1.

maxNrofSRS-ResourceSets INTEGER ::= 16 -- Maximum number of SRS resource sets in a BWP.

maxNrofSRS-ResourceSets-1 INTEGER ::= 15 -- Maximum number of SRS resource sets in a BWP minus 1.

maxNrofSRS-PosResourceSets-r16 INTEGER ::= 16 -- Maximum number of SRS Positioning resource sets in a BWP.

maxNrofSRS-PosResourceSets-1-r16 INTEGER ::= 15 -- Maximum number of SRS Positioning resource sets in a BWP minus 1.

maxNrofSRS-Resources INTEGER ::= 64 -- Maximum number of SRS resources.

maxNrofSRS-Resources-1 INTEGER ::= 63 -- Maximum number of SRS resources minus 1.

maxNrofSRS-PosResources-r16 INTEGER ::= 64 -- Maximum number of SRS Positioning resources.

maxNrofSRS-PosResources-1-r16 INTEGER ::= 63 -- Maximum number of SRS Positioning resources in an SRS Positioning

-- resource set minus 1.

maxNrofSRS-ResourcesPerSet INTEGER ::= 16 -- Maximum number of SRS resources in an SRS resource set

maxNrofSRS-TriggerStates-1 INTEGER ::= 3 -- Maximum number of SRS trigger states minus 1, i.e., the largest code point.

maxNrofSRS-TriggerStates-2 INTEGER ::= 2 -- Maximum number of SRS trigger states minus 2.

maxRAT-CapabilityContainers INTEGER ::= 8 -- Maximum number of interworking RAT containers (incl NR and MRDC)

maxSimultaneousBands INTEGER ::= 32 -- Maximum number of simultaneously aggregated bands

maxULTxSwitchingBandPairs INTEGER ::= 32 -- Maximum number of band pairs supporting dynamic UL Tx switching in a band combination

maxNrofSlotFormatCombinationsPerSet INTEGER ::= 512 -- Maximum number of Slot Format Combinations in a SF-Set.

maxNrofSlotFormatCombinationsPerSet-1 INTEGER ::= 511 -- Maximum number of Slot Format Combinations in a SF-Set minus 1.

maxNrofTrafficPattern-r16 INTEGER ::= 8 -- Maximum number of Traffic Pattern for NR sidelink communication.

maxNrofPUCCH-Resources INTEGER ::= 128

maxNrofPUCCH-Resources-1 INTEGER ::= 127

maxNrofPUCCH-ResourceSets INTEGER ::= 4 -- Maximum number of PUCCH Resource Sets

maxNrofPUCCH-ResourceSets-1 INTEGER ::= 3 -- Maximum number of PUCCH Resource Sets minus 1.

maxNrofPUCCH-ResourcesPerSet INTEGER ::= 32 -- Maximum number of PUCCH Resources per PUCCH-ResourceSet

maxNrofPUCCH-P0-PerSet INTEGER ::= 8 -- Maximum number of P0-pucch present in a p0-pucch set

maxNrofPUCCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUCCH power control.

maxNrofPUCCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUCCH power control minus 1.

maxNrofPUCCH-PathlossReferenceRSs-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for PUCCH power control extended.

maxNrofPUCCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for PUCCH power control

-- minus 1 extended.

maxNrofPUCCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60 -- Difference between the extended maximum and the non-extended maximum

maxNrofPUCCH-ResourceGroups-r16 INTEGER ::= 4 -- Maximum number of PUCCH resources groups.

maxNrofPUCCH-ResourcesPerGroup-r16 INTEGER ::= 128 -- Maximum number of PUCCH resources in a PUCCH group.

maxNrofMultiplePUSCHs-r16 INTEGER ::= 8 -- Maximum number of multiple PUSCHs in PUSCH TDRA list

maxNrofP0-PUSCH-AlphaSets INTEGER ::= 30 -- Maximum number of P0-pusch-alpha-sets (see 38,213, clause 7.1)

maxNrofP0-PUSCH-AlphaSets-1 INTEGER ::= 29 -- Maximum number of P0-pusch-alpha-sets minus 1 (see 38,213, clause 7.1)

maxNrofPUSCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUSCH power control.

maxNrofPUSCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUSCH power control minus 1.

maxNrofPUSCH-PathlossReferenceRSs-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for PUSCH power control extended

maxNrofPUSCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for PUSCH power control minus 1

maxNrofPUSCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60 -- Difference between maxNrofPUSCH-PathlossReferenceRSs-r16 and

-- maxNrofPUSCH-PathlossReferenceRSs

maxNrofNAICS-Entries INTEGER ::= 8 -- Maximum number of supported NAICS capability set

maxBands INTEGER ::= 1024 -- Maximum number of supported bands in UE capability.

maxBandsMRDC INTEGER ::= 1280

maxBandsEUTRA INTEGER ::= 256

maxCellReport INTEGER ::= 8

maxDRB INTEGER ::= 29 -- Maximum number of DRBs (that can be added in DRB-ToAddModLIst).

maxFreq INTEGER ::= 8 -- Max number of frequencies.

maxFreqLayers INTEGER ::= 4 -- Max number of frequency layers.

maxFreqIDC-r16 INTEGER ::= 128 -- Max number of frequencies for IDC indication.

maxCombIDC-r16 INTEGER ::= 128 -- Max number of reported UL CA for IDC indication.

maxFreqIDC-MRDC INTEGER ::= 32 -- Maximum number of candidate NR frequencies for MR-DC IDC indication

maxNrofCandidateBeams INTEGER ::= 16 -- Max number of PRACH-ResourceDedicatedBFR that in BFR config.

maxNrofCandidateBeams-r16 INTEGER ::= 64 -- Max number of candidate beam resources in BFR config.

maxNrofCandidateBeamsExt-r16 INTEGER ::= 48 -- Max number of PRACH-ResourceDedicatedBFR in the CandidateBeamRSListExt

maxNrofPCIsPerSMTC INTEGER ::= 64 -- Maximun number of PCIs per SMTC.

maxNrofQFIs INTEGER ::= 64

maxNrofResourceAvailabilityPerCombination-r16 INTEGER ::= 256

maxNrOfSemiPersistentPUSCH-Triggers INTEGER ::= 64 -- Maximum number of triggers for semi persistent reporting on PUSCH

maxNrofSR-Resources INTEGER ::= 8 -- Maximum number of SR resources per BWP in a cell.

maxNrofSlotFormatsPerCombination INTEGER ::= 256

maxNrofSpatialRelationInfos INTEGER ::= 8

maxNrofSpatialRelationInfos-plus-1 INTEGER ::= 9

maxNrofSpatialRelationInfos-r16 INTEGER ::= 64

maxNrofSpatialRelationInfosDiff-r16 INTEGER ::= 56 -- Difference between maxNrofSpatialRelationInfos-r16 and maxNrofSpatialRelationInfos

maxNrofIndexesToReport INTEGER ::= 32

maxNrofIndexesToReport2 INTEGER ::= 64

maxNrofSSBs-r16 INTEGER ::= 64 -- Maximum number of SSB resources in a resource set.

maxNrofSSBs-1 INTEGER ::= 63 -- Maximum number of SSB resources in a resource set minus 1.

maxNrofS-NSSAI INTEGER ::= 8 -- Maximum number of S-NSSAI.

maxNrofTCI-StatesPDCCH INTEGER ::= 64

maxNrofTCI-States INTEGER ::= 128 -- Maximum number of TCI states.

maxNrofTCI-States-1 INTEGER ::= 127 -- Maximum number of TCI states minus 1.

maxNrofUL-Allocations INTEGER ::= 16 -- Maximum number of PUSCH time domain resource allocations.

maxQFI INTEGER ::= 63

maxRA-CSIRS-Resources INTEGER ::= 96

maxRA-OccasionsPerCSIRS INTEGER ::= 64 -- Maximum number of RA occasions for one CSI-RS

maxRA-Occasions-1 INTEGER ::= 511 -- Maximum number of RA occasions in the system

maxRA-SSB-Resources INTEGER ::= 64

maxSCSs INTEGER ::= 5

maxSecondaryCellGroups INTEGER ::= 3

maxNrofServingCellsEUTRA INTEGER ::= 32

maxMBSFN-Allocations INTEGER ::= 8

maxNrofMultiBands INTEGER ::= 8

maxCellSFTD INTEGER ::= 3 -- Maximum number of cells for SFTD reporting

maxReportConfigId INTEGER ::= 64

maxNrofCodebooks INTEGER ::= 16 -- Maximum number of codebooks suppoted by the UE

maxNrofCSI-RS-ResourcesExt-r16 INTEGER ::= 16 -- Maximum number of codebook resources supported by the UE for eType2/Codebook combo

maxNrofCSI-RS-Resources INTEGER ::= 7 -- Maximum number of codebook resources supported by the UE

maxNrofCSI-RS-ResourcesAlt-r16 INTEGER ::= 512 -- Maximum number of alternative codebook resources supported by the UE

maxNrofCSI-RS-ResourcesAlt-1-r16 INTEGER ::= 511 -- Maximum number of alternative codebook resources supported by the UE minus 1

maxNrofSRI-PUSCH-Mappings INTEGER ::= 16

maxNrofSRI-PUSCH-Mappings-1 INTEGER ::= 15

maxSIB INTEGER::= 32 -- Maximum number of SIBs

maxSI-Message INTEGER::= 32 -- Maximum number of SI messages

maxPO-perPF INTEGER ::= 4 -- Maximum number of paging occasion per paging frame

maxAccessCat-1 INTEGER ::= 63 -- Maximum number of Access Categories minus 1

maxBarringInfoSet INTEGER ::= 8 -- Maximum number of access control parameter sets

maxCellEUTRA INTEGER ::= 8 -- Maximum number of E-UTRA cells in SIB list

maxEUTRA-Carrier INTEGER ::= 8 -- Maximum number of E-UTRA carriers in SIB list

maxPLMNIdentities INTEGER ::= 8 -- Maximum number of PLMN identites in RAN area configurations

maxDownlinkFeatureSets INTEGER ::= 1024 -- (for NR DL) Total number of FeatureSets (size of the pool)

maxUplinkFeatureSets INTEGER ::= 1024 -- (for NR UL) Total number of FeatureSets (size of the pool)

maxEUTRA-DL-FeatureSets INTEGER ::= 256 -- (for E-UTRA) Total number of FeatureSets (size of the pool)

maxEUTRA-UL-FeatureSets INTEGER ::= 256 -- (for E-UTRA) Total number of FeatureSets (size of the pool)

maxFeatureSetsPerBand INTEGER ::= 128 -- (for NR) The number of feature sets associated with one band.

maxPerCC-FeatureSets INTEGER ::= 1024 -- (for NR) Total number of CC-specific FeatureSets (size of the pool)

maxFeatureSetCombinations INTEGER ::= 1024 -- (for MR-DC/NR)Total number of Feature set combinations (size of the pool)

maxInterRAT-RSTD-Freq INTEGER ::= 3

maxHRNN-Len-r16 INTEGER ::= 48 -- Maximum length of HRNNs

maxNPN-r16 INTEGER ::= 12 -- Maximum number of NPNs broadcast and reported by UE at establishment

maxNrOfMinSchedulingOffsetValues-r16 INTEGER ::= 2 -- Maximum number of min. scheduling offset (K0/K2) configurations

maxK0-SchedulingOffset-r16 INTEGER ::= 16 -- Maximum number of slots configured as min. scheduling offset (K0)

maxK2-SchedulingOffset-r16 INTEGER ::= 16 -- Maximum number of slots configured as min. scheduling offset (K2)

maxK0-SchedulingOffset-r17 INTEGER ::= 64 -- Maximum number of slots configured as min. scheduling offset (K0)

maxK2-SchedulingOffset-r17 INTEGER ::= 64 -- Maximum number of slots configured as min. scheduling offset (K2)

maxDCI-2-6-Size-r16 INTEGER ::= 140 -- Maximum size of DCI format 2-6

maxDCI-2-6-Size-1-r16 INTEGER ::= 139 -- Maximum DCI format 2-6 size minus 1

maxNrofUL-Allocations-r16 INTEGER ::= 64 -- Maximum number of PUSCH time domain resource allocations

maxNrofP0-PUSCH-Set-r16 INTEGER ::= 2 -- Maximum number of P0 PUSCH set(s)

maxOnDemandSIB-r16 INTEGER ::= 8 -- Maximum number of SIB(s) that can be requested on-demand

maxOnDemandPosSIB-r16 INTEGER ::= 32 -- Maximum number of posSIB(s) that can be requested on-demand

maxCI-DCI-PayloadSize-r16 INTEGER ::= 126 -- Maximum number of the DCI size for CI

maxCI-DCI-PayloadSize-1-r16 INTEGER ::= 125 -- Maximum number of the DCI size for CI minus 1

maxWLAN-Id-Report-r16 INTEGER ::= 32 -- Maximum number of WLAN IDs to report

maxWLAN-Name-r16 INTEGER ::= 4 -- Maximum number of WLAN name

maxRAReport-r16 INTEGER ::= 8 -- Maximum number of RA procedures information to be included in the RA report

maxTxConfig-r16 INTEGER ::= 64 -- Maximum number of sidelink transmission parameters configurations

maxTxConfig-1-r16 INTEGER ::= 63 -- Maximum number of sidelink transmission parameters configurations minus 1

maxPSSCH-TxConfig-r16 INTEGER ::= 16 -- Maximum number of PSSCH TX configurations

maxNrofCLI-RSSI-Resources-r16 INTEGER ::= 64 -- Maximum number of CLI-RSSI resources for UE

maxNrofCLI-RSSI-Resources-1-r16 INTEGER ::= 63 -- Maximum number of CLI-RSSI resources for UE minus 1

maxNrofCLI-SRS-Resources-r16 INTEGER ::= 32 -- Maximum number of SRS resources for CLI measurement for UE

maxCLI-Report-r16 INTEGER ::= 8

maxNrofConfiguredGrantConfig-r16 INTEGER ::= 12 -- Maximum number of configured grant configurations per BWP

maxNrofConfiguredGrantConfig-1-r16 INTEGER ::= 11 -- Maximum number of configured grant configurations per BWP minus 1

maxNrofCG-Type2DeactivationState INTEGER ::= 16 -- Maximum number of deactivation state for type 2 configured grants per BWP

maxNrofConfiguredGrantConfigMAC-1-r16 INTEGER ::= 31 -- Maximum number of configured grant configurations per MAC entity minus 1

maxNrofSPS-Config-r16 INTEGER ::= 8 -- Maximum number of SPS configurations per BWP

maxNrofSPS-Config-1-r16 INTEGER ::= 7 -- Maximum number of SPS configurations per BWP minus 1

maxNrofSPS-DeactivationState INTEGER ::= 16 -- Maximum number of deactivation state for SPS per BWP

maxNrofDormancyGroups INTEGER ::= 5 --

maxNrofPUCCH-ResourceGroups-1-r16 INTEGER ::= 3 --

maxNrofServingCellsTCI-r16 INTEGER ::= 32 -- Maximum number of serving cells in simultaneousTCI-UpdateList

maxNrofTxDC-TwoCarrier-r16 INTEGER ::= 64 -- Maximum number of UL Tx DC locations reported by the UE for 2CC uplink CA

maxNrofMultiplePDSCHs-r17 INTEGER ::= 8 -- Maximum number of PDSCHs in PDSCH TDRA list

-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-STOP

-- ASN1STOP

Editor’s note: *maxK0-SchedulingOffset* and *maxK0-SchedulingOffset* need confirmation by RAN1

< Unmodified parts omitted >

11.2.2 Message definitions

< Unmodified parts omitted >

*– CG-ConfigInfo*

This message is used by master eNB or gNB to request the SgNB or SeNB to perform certain actions e.g. to establish, modify or release an SCG. The message may include additional information e.g. to assist the SgNB or SeNB to set the SCG configuration. It can also be used by a CU to request a DU to perform certain actions, e.g. to establish, or modify an MCG or SCG.

Direction: Master eNB or gNB to secondary gNB or eNB, alternatively CU to DU.

***CG-ConfigInfo* message**

-- ASN1START

-- TAG-CG-CONFIG-INFO-START

CG-ConfigInfo ::= SEQUENCE {

criticalExtensions CHOICE {

c1 CHOICE{

cg-ConfigInfo CG-ConfigInfo-IEs,

spare3 NULL, spare2 NULL, spare1 NULL

},

criticalExtensionsFuture SEQUENCE {}

}

}

CG-ConfigInfo-IEs ::= SEQUENCE {

ue-CapabilityInfo OCTET STRING (CONTAINING UE-CapabilityRAT-ContainerList) OPTIONAL,-- Cond SN-AddMod

candidateCellInfoListMN MeasResultList2NR OPTIONAL,

candidateCellInfoListSN OCTET STRING (CONTAINING MeasResultList2NR) OPTIONAL,

measResultCellListSFTD-NR MeasResultCellListSFTD-NR OPTIONAL,

scgFailureInfo SEQUENCE {

failureType ENUMERATED { t310-Expiry, randomAccessProblem,

rlc-MaxNumRetx, synchReconfigFailure-SCG,

scg-reconfigFailure,

srb3-IntegrityFailure},

measResultSCG OCTET STRING (CONTAINING MeasResultSCG-Failure)

} OPTIONAL,

configRestrictInfo ConfigRestrictInfoSCG OPTIONAL,

drx-InfoMCG DRX-Info OPTIONAL,

measConfigMN MeasConfigMN OPTIONAL,

sourceConfigSCG OCTET STRING (CONTAINING RRCReconfiguration) OPTIONAL,

scg-RB-Config OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL,

mcg-RB-Config OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL,

mrdc-AssistanceInfo MRDC-AssistanceInfo OPTIONAL,

nonCriticalExtension CG-ConfigInfo-v1540-IEs OPTIONAL

}

CG-ConfigInfo-v1540-IEs ::= SEQUENCE {

ph-InfoMCG PH-TypeListMCG OPTIONAL,

measResultReportCGI SEQUENCE {

ssbFrequency ARFCN-ValueNR,

cellForWhichToReportCGI PhysCellId,

cgi-Info CGI-InfoNR

} OPTIONAL,

nonCriticalExtension CG-ConfigInfo-v1560-IEs OPTIONAL

}

CG-ConfigInfo-v1560-IEs ::= SEQUENCE {

candidateCellInfoListMN-EUTRA OCTET STRING OPTIONAL,

candidateCellInfoListSN-EUTRA OCTET STRING OPTIONAL,

sourceConfigSCG-EUTRA OCTET STRING OPTIONAL,

scgFailureInfoEUTRA SEQUENCE {

failureTypeEUTRA ENUMERATED { t313-Expiry, randomAccessProblem,

rlc-MaxNumRetx, scg-ChangeFailure},

measResultSCG-EUTRA OCTET STRING

} OPTIONAL,

drx-ConfigMCG DRX-Config OPTIONAL,

measResultReportCGI-EUTRA SEQUENCE {

eutraFrequency ARFCN-ValueEUTRA,

cellForWhichToReportCGI-EUTRA EUTRA-PhysCellId,

cgi-InfoEUTRA CGI-InfoEUTRA

} OPTIONAL,

measResultCellListSFTD-EUTRA MeasResultCellListSFTD-EUTRA OPTIONAL,

fr-InfoListMCG FR-InfoList OPTIONAL,

nonCriticalExtension CG-ConfigInfo-v1570-IEs OPTIONAL

}

CG-ConfigInfo-v1570-IEs ::= SEQUENCE {

sftdFrequencyList-NR SFTD-FrequencyList-NR OPTIONAL,

sftdFrequencyList-EUTRA SFTD-FrequencyList-EUTRA OPTIONAL,

nonCriticalExtension CG-ConfigInfo-v1590-IEs OPTIONAL

}

CG-ConfigInfo-v1590-IEs ::= SEQUENCE {

servFrequenciesMN-NR SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF ARFCN-ValueNR OPTIONAL,

nonCriticalExtension CG-ConfigInfo-v1610-IEs OPTIONAL

}

CG-ConfigInfo-v1610-IEs ::= SEQUENCE {

drx-InfoMCG2 DRX-Info2 OPTIONAL,

alignedDRX-Indication ENUMERATED {true} OPTIONAL,

scgFailureInfo-r16 SEQUENCE {

failureType-r16 ENUMERATED { scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,

t312-Expiry-r16, bh-RLF-r16,

spare4, spare3, spare2, spare1},

measResultSCG-r16 OCTET STRING (CONTAINING MeasResultSCG-Failure)

} OPTIONAL,

dummy1 SEQUENCE {

failureTypeEUTRA-r16 ENUMERATED { scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,

t312-Expiry-r16, spare5,

spare4, spare3, spare2, spare1},

measResultSCG-EUTRA-r16 OCTET STRING

} OPTIONAL,

sidelinkUEInformationNR-r16 OCTET STRING (CONTAINING SidelinkUEInformationNR-r16) OPTIONAL,

sidelinkUEInformationEUTRA-r16 OCTET STRING OPTIONAL,

nonCriticalExtension CG-ConfigInfo-v1620-IEs OPTIONAL

}

CG-ConfigInfo-v1620-IEs ::= SEQUENCE {

ueAssistanceInformationSourceSCG-r16 OCTET STRING (CONTAINING UEAssistanceInformation) OPTIONAL,

nonCriticalExtension CG-ConfigInfo-v1640-IEs OPTIONAL

}

CG-ConfigInfo-v1640-IEs ::= SEQUENCE {

servCellInfoListMCG-NR-r16 ServCellInfoListMCG-NR-r16 OPTIONAL,

servCellInfoListMCG-EUTRA-r16 ServCellInfoListMCG-EUTRA-r16 OPTIONAL,

nonCriticalExtension SEQUENCE {} OPTIONAL

}

ServCellInfoListMCG-NR-r16 ::= SEQUENCE (SIZE (1.. maxNrofServingCells)) OF ServCellInfoXCG-NR-r16

ServCellInfoListMCG-EUTRA-r16 ::= SEQUENCE (SIZE (1.. maxNrofServingCellsEUTRA)) OF ServCellInfoXCG-EUTRA-r16

SFTD-FrequencyList-NR ::= SEQUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueNR

SFTD-FrequencyList-EUTRA ::= SEQUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueEUTRA

ConfigRestrictInfoSCG ::= SEQUENCE {

allowedBC-ListMRDC BandCombinationInfoList OPTIONAL,

powerCoordination-FR1 SEQUENCE {

p-maxNR-FR1 P-Max OPTIONAL,

p-maxEUTRA P-Max OPTIONAL,

p-maxUE-FR1 P-Max OPTIONAL

} OPTIONAL,

servCellIndexRangeSCG SEQUENCE {

lowBound ServCellIndex,

upBound ServCellIndex

} OPTIONAL, -- Cond SN-AddMod

maxMeasFreqsSCG INTEGER(1..maxMeasFreqsMN) OPTIONAL,

dummy INTEGER(1..maxMeasIdentitiesMN) OPTIONAL,

...,

[[

selectedBandEntriesMNList SEQUENCE (SIZE (1..maxBandComb)) OF SelectedBandEntriesMN OPTIONAL,

pdcch-BlindDetectionSCG INTEGER (1..15) OPTIONAL,

maxNumberROHC-ContextSessionsSN INTEGER(0.. 16384) OPTIONAL

]],

[[

maxIntraFreqMeasIdentitiesSCG INTEGER(1..maxMeasIdentitiesMN) OPTIONAL,

maxInterFreqMeasIdentitiesSCG INTEGER(1..maxMeasIdentitiesMN) OPTIONAL

]],

[[

p-maxNR-FR1-MCG-r16 P-Max OPTIONAL,

powerCoordination-FR2-r16 SEQUENCE {

p-maxNR-FR2-MCG-r16 P-Max OPTIONAL,

p-maxNR-FR2-SCG-r16 P-Max OPTIONAL,

p-maxUE-FR2-r16 P-Max OPTIONAL

} OPTIONAL,

nrdc-PC-mode-FR1-r16 ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic} OPTIONAL,

nrdc-PC-mode-FR2-r16 ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic} OPTIONAL,

maxMeasSRS-ResourceSCG-r16 INTEGER(0..maxNrofCLI-SRS-Resources-r16) OPTIONAL,

maxMeasCLI-ResourceSCG-r16 INTEGER(0..maxNrofCLI-RSSI-Resources-r16) OPTIONAL,

maxNumberEHC-ContextsSN-r16 INTEGER(0..65536) OPTIONAL,

allowedReducedConfigForOverheating-r16 OverheatingAssistance OPTIONAL,

maxToffset-r16 T-Offset-r16 OPTIONAL

]],

[[

allowedReducedConfigForOverheating-r17 OverheatingAssistance-r17 OPTIONAL

]]

}

SelectedBandEntriesMN ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandEntryIndex

BandEntryIndex ::= INTEGER (0.. maxNrofServingCells)

PH-TypeListMCG ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF PH-InfoMCG

PH-InfoMCG ::= SEQUENCE {

servCellIndex ServCellIndex,

ph-Uplink PH-UplinkCarrierMCG,

ph-SupplementaryUplink PH-UplinkCarrierMCG OPTIONAL,

...

}

PH-UplinkCarrierMCG ::= SEQUENCE{

ph-Type1or3 ENUMERATED {type1, type3},

...

}

BandCombinationInfoList ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationInfo

BandCombinationInfo ::= SEQUENCE {

bandCombinationIndex BandCombinationIndex,

allowedFeatureSetsList SEQUENCE (SIZE (1..maxFeatureSetsPerBand)) OF FeatureSetEntryIndex

}

FeatureSetEntryIndex ::= INTEGER (1.. maxFeatureSetsPerBand)

DRX-Info ::= SEQUENCE {

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

}

DRX-Info2 ::= 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 }

}

}

MeasConfigMN ::= SEQUENCE {

measuredFrequenciesMN SEQUENCE (SIZE (1..maxMeasFreqsMN)) OF NR-FreqInfo OPTIONAL,

measGapConfig SetupRelease { GapConfig } OPTIONAL,

gapPurpose ENUMERATED {perUE, perFR1} OPTIONAL,

...,

[[

measGapConfigFR2 SetupRelease { GapConfig } OPTIONAL

]]

}

MRDC-AssistanceInfo ::= SEQUENCE {

affectedCarrierFreqCombInfoListMRDC SEQUENCE (SIZE (1..maxNrofCombIDC)) OF AffectedCarrierFreqCombInfoMRDC,

...,

[[

overheatingAssistanceSCG-r16 OCTET STRING (CONTAINING OverheatingAssistance) OPTIONAL

]]

}

AffectedCarrierFreqCombInfoMRDC ::= SEQUENCE {

victimSystemType VictimSystemType,

interferenceDirectionMRDC ENUMERATED {eutra-nr, nr, other, utra-nr-other, nr-other, spare3, spare2, spare1},

affectedCarrierFreqCombMRDC SEQUENCE {

affectedCarrierFreqCombEUTRA AffectedCarrierFreqCombEUTRA OPTIONAL,

affectedCarrierFreqCombNR AffectedCarrierFreqCombNR

} OPTIONAL

}

VictimSystemType ::= SEQUENCE {

gps ENUMERATED {true} OPTIONAL,

glonass ENUMERATED {true} OPTIONAL,

bds ENUMERATED {true} OPTIONAL,

galileo ENUMERATED {true} OPTIONAL,

wlan ENUMERATED {true} OPTIONAL,

bluetooth ENUMERATED {true} OPTIONAL

}

AffectedCarrierFreqCombEUTRA ::= SEQUENCE (SIZE (1..maxNrofServingCellsEUTRA)) OF ARFCN-ValueEUTRA

AffectedCarrierFreqCombNR ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF ARFCN-ValueNR

-- TAG-CG-CONFIG-INFO-STOP

-- ASN1STOP

|  |
| --- |
| ***CG-ConfigInfo* field descriptions** |
| ***alignedDRX-Indication***  This field is signalled upon MN triggered CGI reporting by the UE that requires aligned DRX configurations between the MCG and the SCG (i.e. same DRX cycle and on-duration configured by MN completely contains on-duration configured by SN). |
| ***allowedBC-ListMRDC***  A list of indices referring to band combinations in MR-DC capabilities from which SN is allowed to select the SCG band combination. Each entry refers to:  - a band combination numbered according to *supportedBandCombinationList* and *supportedBandCombinationList-UplinkTxSwitch* in the *UE-MRDC-Capability* (in case of (NG)EN-DC), or according to *supportedBandCombinationList* and *supportedBandCombinationListNEDC-Only* in the *UE-MRDC-Capability* (in case of NE-DC), or according to *supportedBandCombinationList* in the UE-NR-Capability (in case of NR-DC),  - and the Feature Sets allowed for each band entry. All MR-DC band combinations indicated by this field comprise the MCG band combination, which is a superset of the MCG band(s) selected by MN. |
| ***allowedReducedConfigForOverheating***  Indicates the reduced configuration that the SCG is allowed to configure.  *reducedMaxCCs* in *allowedReducedConfigForOverheating* indicates the maximum number of downlink/uplink PSCell/SCells that the SCG is allowed to configure. This field is used in (NG)EN-DC and NR-DC.  *reducedMaxBW-FR1* and *reducedMaxBW-FR2* in *allowedReducedConfigForOverheating* indicates the maximum aggregated bandwidth across all downlink/uplink carriers of FR1 and FR2-1, respectively that the SCG is allowed to configure. *reducedMaxBW-FR2* in *allowedReducedConfigForOverheating-r17* indicates the maximum aggregated bandwidth across all downlink/uplink carriers of FR2-2 that the SCG is allowed to configure. This field is only used in NR-DC.  *reducedMaxMIMO-LayersFR1* and *reducedMaxMIMO-LayersFR2* in *allowedReducedConfigForOverheating* indicates the maximum number of downlink/uplink MIMO layers of each serving cell operating on FR1 and FR2-1, respectively that the SCG is allowed to configure. *reducedMaxMIMO-LayersFR2-2* in *allowedReducedConfigForOverheating-r17* indicates the maximum number of downlink/uplink MIMO layers of each serving cell operating on FR2-2 that the SCG is allowed to configure. This field is only used in NR-DC. |
| ***candidateCellInfoListMN***, ***candidateCellInfoListSN***  Contains information regarding cells that the master node or the source node suggests the target gNB or DU to consider configuring.  For (NG)EN-DC, including CSI-RS measurement results in *candidateCellInfoListMN* is not supported in this version of the specification. For NR-DC, including SSB and/or CSI-RS measurement results in *candidateCellInfoListMN* is supported. |
| ***candidateCellInfoListMN-EUTRA***, ***candidateCellInfoListSN-EUTRA***  Includes the *MeasResultList3EUTRA* as specified in TS 36.331 [10]. Contains information regarding cells that the master node or the source node suggests the target secondary eNB to consider configuring. These fields are only used in NE-DC. |
| ***configRestrictInfo***  Includes fields for which SgNB is explicitly indicated to observe a configuration restriction. |
| ***drx-ConfigMCG***  This field contains the complete DRX configuration of the MCG. This field is only used in NR-DC. |
| ***drx-InfoMCG***  This field contains the DRX long and short cycle configuration of the MCG. This field is used in (NG)EN-DC and NE-DC. |
| ***drx-InfoMCG2***  This field contains the *drx-onDurationTimer* configuration of the MCG. This field is only used in (NG)EN-DC. |
| ***fr-InfoListMCG***  Contains information of FR information of serving cells that include PCell and SCell(s) configured in MCG. |
| ***dummy, dummy1***  These fields are not used in the specification and SN ignores the received value(s). |
| ***maxInterFreqMeasIdentitiesSCG***  Indicates the maximum number of allowed measurement identities that the SCG is allowed to configure for inter-frequency measurement. The maximum value for this field is 10. If the field is absent, the SCG is allowed to configure inter-frequency measurements up to the maximum value. This field is only used in NR-DC. |
| ***maxIntraFreqMeasIdentitiesSCG***  Indicates the maximum number of allowed measurement identities that the SCG is allowed to configure for intra-frequency measurement on each serving frequency. The maximum value for this field is 9 (in case of (NG)EN-DC or NR-DC) or 10 (in case of NE-DC). If the field is absent, the SCG is allowed to configure intra-frequency measurements up to the maximum value on each serving frequency. |
| ***maxMeasCLI-ResourceSCG***  Indicates the maximum number of CLI RSSI resources that the SCG is allowed to configure. |
| ***maxMeasFreqsSCG***  Indicates the maximum number of NR inter-frequency carriers the SN is allowed to configure with PSCell for measurements. |
| ***maxMeasSRS-ResourceSCG***  Indicates the maximum number of SRS resources that the SCG is allowed to configure for CLI measurement. |
| ***maxNumberROHC-ContextSessionsSN***  Indicates the maximum number of ROHC context sessions allowed to SN terminated bearer, excluding context sessions that leave all headers uncompressed. |
| ***maxNumberEHC-ContextsSN***  Indicates the maximum number of EHC contexts allowed to the SN terminated bearer. The field indicates the number of contexts in addition to CID = "all zeros", as specified in TS 38.323 [5]. |
| ***maxToffset***  Indicates the maximum Toffset value the SN is allowed to use for scheduling SCG transmissions (see TS 38.213 [13]). This field is used in NR-DC only when the fields *nrdc-PC-mode-FR1-r16* or *nrdc-PC-mode-FR2-r16* are set to dynamic. Value *ms0dot5* corresponds to 0.5 ms, value *ms0dot75* corresponds to 0.75 ms, value *ms1* corresponds to 1 ms and so on. |
| ***measuredFrequenciesMN***  Used by MN to indicate a list of frequencies measured by the UE. |
| ***measGapConfig***  Indicates the FR1 and perUE measurement gap configuration configured by MN. |
| ***measGapConfigFR2***  Indicates the FR2 measurement gap configuration configured by MN. |
| ***mcg-RB-Config***  Contains all of the fields in the IE *RadioBearerConfig* used in MN, used by the SN to support delta configuration to UE (i.e. when MN does not use full configuration option), for bearer type change between MN terminated bearer with NR PDCP to SN terminated bearer. It is also used to indicate the PDCP duplication related information for MN terminated split bearer (whether duplication is configured and if so, whether it is initially activated) in SN Addition/Modification procedure. Otherwise, this field is absent. |
| ***measResultReportCGI, measResultReportCGI-EUTRA***  Used by MN to provide SN with CGI-Info for the cell as per SN′s request. In this version of the specification, the *measResultReportCGI* is used for (NG)EN-DC and NR-DC and the *measResultReportCGI-EUTRA* is used only for NE-DC. |
| ***measResultSCG-EUTRA***  This field includes the *MeasResultSCG-FailureMRDC* IE as specified in TS 36.331 [10]. This field is only used in NE-DC. |
| ***measResultSFTD-EUTRA***  SFTD measurement results between the PCell and the E-UTRA PScell in NE-DC. This field is only used in NE-DC. |
| ***mrdc-AssistanceInfo***  Contains the IDC assistance information for MR-DC reported by the UE (see TS 36.331 [10]). |
| ***nrdc-PC-mode-FR1***  Indicates the uplink power sharing mode that the UE uses in NR-DC FR1 (see TS 38.213 [13], clause 7.6). |
| ***nrdc-PC-mode-FR2***  Indicates the uplink power sharing mode that the UE uses in NR-DC FR2 (see TS 38.213 [13], clause 7.6). |
| ***overheatingAssistanceSCG***  Contains the UE's preference on reduced configuration for NR SCG to address overheating. This field is only used in (NG)EN-DC. |
| ***p-maxEUTRA***  Indicates the maximum total transmit power to be used by the UE in the E-UTRA cell group (see TS 36.104 [33]). This field is used in (NG)EN-DC and NE-DC. |
| ***p-maxNR-FR1***  Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]). The field is used in (NG)EN-DC and NE-DC. |
| ***p-maxUE-FR1***  Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1). |
| ***p-maxNR-FR1-MCG***  Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]) the UE can use in NR MCG. This field is only used in NR-DC. |
| ***p-maxNR-FR2-SCG***  Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR SCG. |
| ***p-maxUE-FR2***  Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 2 (FR2). |
| ***p-maxNR-FR2-MCG***  Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR MCG. |
| ***pdcch-BlindDetectionSCG***  Indicates the maximum value of the reference number of cells for PDCCH blind detection allowed to be configured for the SCG. |
| ***ph-InfoMCG***  Power headroom information in MCG that is needed in the reception of PHR MAC CE in SCG. |
| ***ph-SupplementaryUplink***  Power headroom information for supplementary uplink. For UE in (NG)EN-DC, this field is absent. |
| ***ph-Type1or3***  Type of power headroom for a serving cell in MCG (PCell and activated SCells). *type1* refers to type 1 power headroom, *type3* refers to type 3 power headroom. (See TS 38.321 [3]). |
| ***ph-Uplink***  Power headroom information for uplink. |
| ***powerCoordination-FR1***  Indicates the maximum power that the UE can use in FR1. |
| ***powerCoordination-FR2***  Indicates the maximum power that the UE can use in frequency range 2 (FR2). This field is only used in NR-DC. |
| ***scgFailureInfo***  Contains SCG failure type and measurement results. In case the sender has no measurement results available, the sender may include one empty entry (i.e. without any optional fields present) in *measResultPerMOList*. This field is used in (NG)EN-DC and NR-DC. |
| ***scg-RB-Config***  Contains all of the fields in the IE RadioBearerConfig used in SN, used to allow the target SN to use delta configuration to the UE, e.g. during SN change. The field is signalled upon change of SN unless MN uses full configuration option. Otherwise, the field is absent. |
| ***selectedBandEntriesMNList***  A list of indices referring to the position of a band entry selected by the MN, in each band combination entry in *allowedBC-ListMRDC* IE. *BandEntryIndex* 0 identifies the first band in the *bandList* of the *BandCombination*, *BandEntryIndex* 1 identifies the second band in the *bandList* of the *BandCombination*, and so on. This *selectedBandEntriesMNList* includes the same number of entries, and listed in the same order as in *allowedBC-ListMRDC*. The SN uses this information to determine which bands out of the NR band combinations in *allowedBC-ListMRDC* it can configure in SCG in NR-DC. The SN can use this information to determine for which band pair(s) it should check *SimultaneousRxTxPerBandPair*. |
| ***servCellIndexRangeSCG***  Range of serving cell indices that SN is allowed to configure for SCG serving cells. |
| ***servCellInfoListMCG-EUTRA***  Indicates the carrier frequency and the transmission bandwidth of the serving cell(s) in the MCG in intra-band (NG)EN-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in (NG)EN-DC. |
| ***servCellInfoListMCG-NR***  Indicates the frequency band indicator, carrier center frequency, UE specific channel bandwidth and SCS of the serving cell(s) in the MCG in intra-band NE-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in NE-DC. |
| ***servFrequenciesMN-NR***  Indicates the frequency of all serving cells that include PCell and SCell(s) with SSB configured in MCG. This field is only used in NR-DC. *servFrequenciesMN-NR* indicates *absoluteFrequencySSB*. |
| ***sftdFrequencyList-NR***  Includes a list of SSB frequencies. Each entry identifies the SSB frequency of a PSCell, which corresponds to one *MeasResultCellSFTD-NR* entry in the *MeasResultCellListSFTD-NR*. |
| ***sftdFrequencyList-EUTRA***  Includes a list of E-UTRA frequencies. Each entry identifies the carrier frequency of a PSCell, which corresponds to one *MeasResultSFTD-EUTRA* entry in the *MeasResultCellListSFTD-EUTRA*. |
| ***sidelinkUEInformationEUTRA***  This field contains the E-UTRA *SidelinkUEInformation* message as specified in TS 36.331 [10]. |
| ***sidelinkUEInformationNR***  This field contains the NR *SidelinkUEInformationNR* message. |
| ***sourceConfigSCG***  Includes all of the current SCG configurations used by the target SN to build delta configuration to be sent to UE, e.g. during SN change. The field contains the *RRCReconfiguration* message, i.e. including *secondaryCellGroup* and *measConfig*. The field is signalled upon change of SN, unless MN uses full configuration option. Otherwise, the field is absent. |
| ***sourceConfigSCG-EUTRA***  Includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration.* In this version of the specification, this field is absent when master gNB uses full configuration option. This field is only used in NE-DC. |
| ***ueAssistanceInformationSourceSCG***  Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR *UEAssistanceInformation* message for the source SCG, if any. |
| ***ue-CapabilityInfo***  Contains the IE *UE-CapabilityRAT-ContainerList* supported by the UE (see NOTE 3). A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information. |

|  |
| --- |
| ***BandCombinationInfo* field descriptions** |
| ***allowedFeatureSetsList***  Defines a subset of the entries in a *FeatureSetCombination*. Each index identifies a position in the *FeatureSetCombination*, which corresponds to one *FeatureSetUplink*/*Downlink* for each band entry in the associated band combination. |
| ***bandCombinationIndex***  In case of NR-DC, this field indicates the position of a band combination in the *supportedBandCombinationList*. In case of NE-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationListNEDC-Only*. In case of (NG)EN-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationList-UplinkTxSwitch*. Band combination entries in *supportedBandCombinationList* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList*. Band combination entries in *supportedBandCombinationListNEDC-Only* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* increased by the number of entries in *supportedBandCombinationList*. Band combination entries in *supportedBandCombinationList-UplinkTxSwitch* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList-UplinkTxSwitch* increased by the number of entries in *supportedBandCombinationList*. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *SN-AddMod* | The field is mandatory present upon SN addition and SN change. It is optionally present upon SN modification and inter-MN handover without SN change. Otherwise, the field is absent. |

NOTE 3: The following table indicates per MN RAT and SN RAT whether RAT capabilities are included or not in *ue-CapabilityInfo*.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MN RAT** | **SN RAT** | **NR capabilities** | **E-UTRA capabilities** | **MR-DC capabilities** |
| E-UTRA | NR | Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise | Not included | Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise |
| NR | E-UTRA | Not included | Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise | Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise |
| NR | NR | Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise | Not included | Not included |

-------------------------------------------------------------------------- <End of change> -------------------------------------------------------------------------

# Annex

Relevant RAN2#116bis-e agreements:

* A4: channelAccessMode2 is signaled as ENUMERATED {enabled}
* C1: The parameter enableTimeDomainHARQ-BundlingType1-r17 is introduced in *ServingCellConfig* with the value “ENUMERATED {enabled}”. FFS if the name can be shortened.
* C2: maxNrofMultiplePDSCHs-r17 is defined in pdsch-TimeDomainAllocationListForMultiPDSCH-r17 with the value 8.
* C3: No restrictions are captured in RRC for pdsch-TimeDomainAllocationListForMultiPDSCH.
* C4: The following are agreed for signaling of PDSCH TDRA:

• The new PDSCH-TimeDomainResourceAllocation-r17 IE can be configured with either PDSCH repetition or multiple PDSCH.

• Introduce the field pdsch-TimeDomainAllocationListDCI-1-2-r17 and the field pdsch-TimeDomainAllocationList-r17 so that PDSCH repetitions can be used with the new k0 value range.

* C5: Introduce the field pusch-TimeDomainAllocationListDCI-1-2-r17 and the field pusch-TimeDomainAllocationList-r17 so that PUSCH repetition can be used with the new k2 value range.
* C6: The IE pusch-TimeDomainAllocationListForMultiPUSCH-r17 is configured with up to 16 list elements.
* C8: New Rel-17 IEs for UL-AccessConfigListDCI-0-1 and UL-AccessConfigListDCI-1-1 are introduced.
* C7: k2(n) should always be signaled by the network
* D1: A new parameter ra-ResponseWindow-r17 with the value ENUMERATED {sl240, sl320, sl640, sl960, sl1280, sl1920, sl2560} is introduced for 4-step RACH for operation in FR2-2 shared spectrum.
* D2: A new parameter msgB-ResponseWindow-r17 with the value ENUMERATED {sl640, sl960, sl1280, sl1920, sl2560} is introduced for 2-step RACH for operation in FR2-2.
* E1: New values, e.g. 0.0313ms, 0.0156ms, 0.01ms, are added to maxPUSCH-Duration for FR2-2.
* Proposal E2: New values are added to IEs in UAI power saving and overheating parameters to reflect the new SCS, K0/K2, and bandwidth sizes for FR2-2.
* Proposal E3: cg-RetransmissionTimer is optionally configured for operation in FR2-2 shared spectrum.
* Proposal E4: New periodicity and offset values corresponding to the existing absolute periodicity and offset are introduced for Configured Grant in FR2-2. FFS if we introduce new absolute values
* Proposal E5: New periodicity and offset values corresponding to the existing absolute periodicity and offset are introduced for Scheduling Request in FR2-2. FFS if we introduce new absolute values
* Proposal E6: New periodicity values corresponding to the existing absolute periodicities are introduced for SPS in FR2-2.

Relevant RAN2#117 agreements:

* 1: RAN2 to reuse the existing prohibit timer (i.e., overheatingIndicationProhibitTimer) also for newly introduced OverheatingAssistance-r17.
* 2: RAN2 to reuse the existing prohibit timers (i.e., maxBW-PreferenceProhibitTimer-r16, maxMIMO-LayerPreferenceProhibitTimer-r16, minSchedulingOffsetPreferenceProhibitTimer-r16) for newly introduced power saving parameters (i.e., maxBW-PreferenceFR2-2-r17, maxMIMO-LayerPreferenceFR2-2-r17, ~~minSchedulingOffsetPreferenceProhibitTimer-r16~~ *minSchedulingOffsetPreference-r17*)
* 3: RAN2 to introduce new indicators (e.g., 1bit indicator for each new parameter in UAI) in OtherConfig IE as in the below TP. If it is agreed, the TP in Annex A.1 can be considered as baseline.

The related new parameters in UAI: maxBW-PreferenceFR2-2-r17, maxMIMO-LayerPreferenceFR2-2-r17, minSchedulingOffsetPreferenceFR2-2-r17

* 1 (easy) Only adopt the new value 0.01ms for maxPUSCH-Duration for FR2-2
* 2 (easy)To confirm that the field description for subCarrierSpacingCommon needs to be clarified that only for operation with shared spectrum channel access, this field is used for deriving the QCL value
* 3 (easy)To adopt the changes captured in the RRC CR [R2-2203644](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_117-e/Docs/R2-2203644.zip) for the field description of subCarrierSpacingCommon
* 6 (easy) Adopt the value range in [R2-2203644](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_117-e/Docs/R2-2203644.zip) for minSchedulingOffsetPreference in case of SCS 480 kHz (range is identical for K0 and K2), i.e., scaled by 4 compared to the existing values for 60/120 kHz SCS
* 8 (easy) Not to support the new values for periodicity in addition to periodicityExt in ConfiguredGrantConfig
* 9 (easy) Only support CG periodicity values in the unit of slot for SCS of 480 and 960 kHz in ConfiguredGrantConfig
* 11 (easy) Adopt new values captured in the RRC CR [R2-2203644](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_117-e/Docs/R2-2203644.zip) for periodicityAndOffset (i.e., scale the legacy values of 120 kHz by 4 and 8 for SCS 480 and 960 kHz while skipping the values in the unit of symbol)

5 Agree to introduce the maximum bandwidth values in the below for SCS 480 and 960 kHz: ReducedAggregatedBandwidth-r17 ::= ENUMERATED {mhz0, mhz100, mhz200, mhz400, mhz800, mhz1200, mhz1600, mhz2000}

* Can come back to this in the next meeting if there are issues with RAN4 with these values (no LS sent but companies should check with the RAN4 collegaues). Add editor's note about this to RRC CR.
* Proposal 4 (discussion) To adopt 64 for maxSchedulingK0/2-SchedulingOffset-r17 for SCS 480 and 960 kHz
* Can come back to this in the next meeting if there are issues with RAN1 with these values (no LS sent but companies should check with the RAN1 colleagues). Add editor's note about this to RRC CR.
* 7 Adopt the value range in [R2-2203644](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_117-e/Docs/R2-2203644.zip) for minSchedulingOffsetPreference in case of SCS 960 kHz (range is identical for K0 and K2), i.e., scaled by 4 compared to the existing values for 60/120 kHz SCS
* 10 To define new fields specifying the extended values for periodicityExt and timeDomainOffset in case of SCS 480 and 960 kHz (i.e. values in terms of integers, with maximum up to 4/8 times maximum of current values for 480/960 KHz). Define fields starting from zero to maximum.
* 12 RAN2 to confirm to introduce values up to 448 (integer 0..448) for DRX parameters for SCS of 480 and 960 kHz, for drx-HARQ-RTT-TimerDL and drx-HARQ-RTT-TimerUL. These are conditionally mandatory for FR2-2 UEs.
* Can consider in the next meeting if LTE RRC CR is needed for this WI based on contributions.
* RAN2 considers the the WI is completed and can proceed to ASN.1 review. Status report should indicate if there are open issues for Stage-3.