**3GPP TSG-RAN2 Meeting #117-e *R2-220xxxx***

**Online, 21th** **- Feb-3rd Mar 2022**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **2924** | **rev** | **1** | **Current version:** | **16.7.0** |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | Introduction of ePowSav in TS 38.331 |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_UE\_pow\_sav\_enh-Core |  | ***Date:*** | 2022-03-03 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | R17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Introduction of R17 UE Power Saving for NR. |
|  |  |
| ***Summary of change:*** | The following changes are made:RAN2#116 e-meeting:1. Add a new SIB-X for TRS/CSI-RS configuration for idle/inactive-mode UEs.
2. Add parameters according to RAN1’s LS (R2-2111246).
3. Add parameters related to paging subgrouping

RAN2#116bis e-meeting:1. Add parameters according to RAN1’s LS(R2-2200095).
2. Updated subgroup related configurations according to the e-meeting agreements

RAN2#117 e-meeting:1. Add parameters according to RAN1’s LS(R2-2202111).
2. Add RLM/BFD relaxation criteria and configuration
3. Added further details on TRS configuration
4. Added further details on PEI/subgrouping configuration
 |
|  |  |
| ***Consequences if not approved:*** | R17 UE Power Saving for NR is not supported. |
|  |  |
| ***Clauses affected:*** |  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **x** |  |  Other core specifications  | TS 38.300 CRxxxxTS 38.304 CRxxxxTS 38.306 CRxxxxTS 38.133 CRxxxxTS 38.213 CRxxxx |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*Start of Changes*

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core Network

ACK Acknowledgement

AM Acknowledged Mode

ARQ Automatic Repeat Request

AS Access Stratum

ASN.1 Abstract Syntax Notation One

BAP Backhaul Adaptation Protocol

BCD Binary Coded Decimal

BFD Beam Failure Detection

BH Backhaul

BLER Block Error Rate

BWP Bandwidth Part

CA Carrier Aggregation

CAG Closed Access Group

CAG-ID Closed Access Group Identifier

CAPC Channel Access Priority Class

CBR Channel Busy Ratio

CCCH Common Control Channel

CG Cell Group

CHO Conditional Handover

CLI Cross Link Interference

CMAS Commercial Mobile Alert Service

CP Control Plane

CPC Conditional PSCell Change

C-RNTI Cell RNTI

CSI Channel State Information

DAPS Dual Active Protocol Stack

DC Dual Connectivity

DCCH Dedicated Control Channel

DCI Downlink Control Information

DCP DCI with CRC scrambled by PS-RNTI

DFN Direct Frame Number

DL Downlink

DL-PRS Downlink Positioning Reference Signal

DL-SCH Downlink Shared Channel

DM-RS Demodulation Reference Signal

DRB (user) Data Radio Bearer

DRX Discontinuous Reception

DTCH Dedicated Traffic Channel

EN-DC E-UTRA NR Dual Connectivity with E-UTRA connected to EPC

EPC Evolved Packet Core

EPS Evolved Packet System

ETWS Earthquake and Tsunami Warning System

E-UTRA Evolved Universal Terrestrial Radio Access

E-UTRA/5GC E-UTRA connected to 5GC

E-UTRA/EPC E-UTRA connected to EPC

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDD Frequency Division Duplex

FFS For Further Study

GERAN GSM/EDGE Radio Access Network

GNSS Global Navigation Satellite System

GSM Global System for Mobile Communications

HARQ Hybrid Automatic Repeat Request

HRNN Human Readable Network Name

IAB Integrated Access and Backhaul

IAB-DU IAB-node DU

IAB-MT IAB Mobile Termination

IDC In-Device Coexistence

IE Information element

IMSI International Mobile Subscriber Identity

kB Kilobyte (1000 bytes)

L1 Layer 1

L2 Layer 2

L3 Layer 3

LBT Listen Before Talk

MAC Medium Access Control

MCG Master Cell Group

MDT Minimization of Drive Tests

MIB Master Information Block

MPE Maximum Permissible Exposure

MR-DC Multi-Radio Dual Connectivity

N/A Not Applicable

NE-DC NR E-UTRA Dual Connectivity

(NG)EN-DC E-UTRA NR Dual Connectivity (covering E-UTRA connected to EPC or 5GC)

NGEN-DC E-UTRA NR Dual Connectivity with E-UTRA connected to 5GC

NID Network Identifier

NPN Non-Public Network

NR-DC NR-NR Dual Connectivity

NR/5GC NR connected to 5GC

PCell Primary Cell

PDCP Packet Data Convergence Protocol

PDU Protocol Data Unit

PEI Paging Early Indication

PLMN Public Land Mobile Network

PNI-NPN Public Network Integrated Non-Public Network

posSIB Positioning SIB

PRS Positioning Reference Signal

PSCell Primary SCG Cell

PWS Public Warning System

QoS Quality of Service

RAN Radio Access Network

RAT Radio Access Technology

RLC Radio Link Control

RLM Radio Link Monitoring

RMTC RSSI Measurement Timing Configuration

RNA RAN-based Notification Area

RNTI Radio Network Temporary Identifier

ROHC Robust Header Compression

RPLMN Registered Public Land Mobile Network

RRC Radio Resource Control

RS Reference Signal

SBAS Satellite Based Augmentation System

SCell Secondary Cell

SCG Secondary Cell Group

SCS Subcarrier Spacing

SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information

SIB System Information Block

SL Sidelink

SLSS Sidelink Synchronisation Signal

SNPN Stand-alone Non-Public Network

SpCell Special Cell

SRB Signalling Radio Bearer

SRS Sounding Reference Signal

SSB Synchronization Signal Block

TAG Timing Advance Group

TDD Time Division Duplex

TM Transparent Mode

UE User Equipment

UL Uplink

UM Unacknowledged Mode

UP User Plane

In the ASN.1, lower case may be used for some (parts) of the above abbreviations e.g. c-RNTI.

*<Next modification>*

##### 5.2.2.4.x Actions upon reception of *SIBx*

Upon receiving *SIBx*, the UE shall:

1> if the UE has stored at least one segment of *SIBx* and the value tag of *SIBx* has changed since a previous segment was stored:

2> discard all stored segments;

1> store the segment;

1> if all segments have been received:

2> assemble *SIBx-IEs* from the received segments.

The UE should discard any stored segments for *SIBx* if the complete *SIBx* has not been assembled within a period of 3 hours. The UE shall discard any stored segments for *SIBx* upon cell (re-) selection.

*<Next modification>*

5.3.5.5.7 SpCell Configuration

The UE shall:

1> if the *SpCellConfig* contains the *rlf-TimersAndConstants*:

2> configure the RLF timers and constants for this cell group as specified in 5.3.5.5.6;

1> else if *rlf-TimersAndConstants* is not configured for this cell group:

2> if any DAPS bearer is configured:

3> use values for timers T301, T310, T311 and constants N310, N311 for the target cell group, as included in *ue-TimersAndConstants* received in *SIB1*;

2> else

3> use values for timers T301, T310, T311 and constants N310, N311, as included in *ue-TimersAndConstants* received in *SIB1*;

1> if the *SpCellConfig* contains *spCellConfigDedicated*:

2> configure the SpCell in accordance with the *spCellConfigDedicated*;

2> consider the bandwidth part indicated in *firstActiveUplinkBWP-Id* if configured to be the active uplink bandwidth part;

2> consider the bandwidth part indicated in *firstActiveDownlinkBWP-Id* if configured to be the active downlink bandwidth part;

2> if any of the reference signal(s) that are used for radio link monitoring are reconfigured by the received *spCellConfigDedicated*:

3> stop timer T310 for the corresponding SpCell, if running;

3> stop timer T312 for the corresponding SpCell, if running;

3> reset the counters N310 and N311.

1> if the *SpCellConfig* contains the *lowMobilityEvaluationConnected*:

2> the UE may perform the evaluation of the low mobility criterion for this cell group as specified in 5.7.X.1;

1> if the *SpCellConfig* contains the *goodServingCellEvaluationRLM*:

2> the UE may perform the evaluation of the good serving cell quality criterion for this cell group as specified in 5.7.X.2;

1> if the *SpCellConfig* contains the *goodServingCellEvaluationBFD*:

2> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.X.2;

*<Next modification>*

5.3.5.5.9 SCell Addition/Modification

The UE shall:

1> for each *sCellIndex* value included in the *sCellToAddModList* that is not part of the current UE configuration (SCell addition):

2> add the SCell, corresponding to the *sCellIndex*, in accordance with the *sCellConfigCommon* and *sCellConfigDedicated*;

2> if the *sCellState* is included:

3> configure lower layers to consider the SCell to be in activated state;

2> else:

3> configure lower layers to consider the SCell to be in deactivated state;

2> for each *measId* included in the *measIdList* within *VarMeasConfig*:

3> if SCells are not applicable for the associated measurement; and

3> if the concerned SCell is included in *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*:

4> remove the concerned SCell from *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

2> if the *SCellConfig* contains the *goodServingCellEvaluationBFD*:

3> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.X.2.

1> for each *sCellIndex* value included in the *sCellToAddModList* that is part of the current UE configuration (SCell modification):

2> modify the SCell configuration in accordance with the *sCellConfigDedicated*;

2> if the *sCellToAddModList* was received in an *RRCReconfiguration* message including *reconfigurationWithSync,* or received in an *RRCResume* message, or received in an *RRCReconfiguration* message including *reconfigurationWithSync* embedded in an *RRCResume* message or embedded in an *RRCReconfiguration* message or embedded in an E-UTRA *RRCConnectionReconfiguration* message or embedded in an E-UTRA *RRCConnectionResume* message:

3> if the *sCellState* is included:

4> configure lower layers to consider the SCell to be in activated state;

3> else:

4> configure lower layers to consider the SCell to be in deactivated state.

2> if the *SCellConfig* contains the *goodServingCellEvaluationBFD*:

3> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.X.2.

*<Next modification>*

## 5.7 Other

*<Partially omitted>*

### 5.7.x RLM/BFD relaxation

#### 5.7.X.1 Relaxed measurement criterion for low mobility

The relaxed measurement criterion for UE with low mobility in RRC\_CONNECTED is fulfilled when:

- (SS-RSRPRef – SS-RSRP) < SSearchDeltaP-Connected,

Where:

- SS-RSRP = current L3 RSRP measurement of the SpCell based on SSB (dB).

- SS-RSRPRef = reference L3 RSRP measurement of the SpCell based on SSB (dB), set as follows:

- After receiving low mobility criterion configuration, or

- After MAC of the CG successfully completes a Random Access procedure after applying a *reconfigurationWithSync* in *spCellConfig* of the CG while low mobility criterion is configured, or

- If (SS-RSRP - SS-RSRPRef) > 0, or

- If the relaxed measurement criterion has not been met for TSearchDeltaP-Connected:

- The UE shall set the value of SS-RSRPRef to the current SS-RSRP value of the SpCell.

#### 5.7.X.2 Relaxed measurement criterion for good serving cell quality

The relaxed measurement criterion of good serving cell quality for RLM starts to be evaluated after receiving the good serving cell quality criterion configuration and is fulfilled when the downlink radio link quality on the configured RLM-RS resource is evaluated to be better than the threshold Qin+XdB,, wherein

* Qin is specified in section 8.1 of TS 38.133 [14].
* X is the parameter *offset* in *goodServingCellEvaluationRLM*.

The relaxed measurement criterion of good serving cell quality for BFD starts to be evaluated after receiving the good serving cell quality criterion configuration and is fulfilled when the downlink radio link quality on the configured BFD-RS resource is evaluated to be better than the threshold Qin+XdB,, wherein

* Qin is specified in section 8.1 of TS 38.133 [14].
* X is the parameter *offset* in *goodServingCellEvaluationBFD*.

*<Next modification>*

### 6.2.2 Message definitions

*<Partially omitted>*

#### – *SystemInformation*

The *SystemInformation* message is used to convey one or more System Information Blocks or Positioning System Information Blocks. All the SIBs or posSIBs included are transmitted with the same periodicity.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

*SystemInformation message*

-- ASN1START

-- TAG-SYSTEMINFORMATION-START

SystemInformation ::= SEQUENCE {

 criticalExtensions CHOICE {

 systemInformation SystemInformation-IEs,

 criticalExtensionsFuture-r16 CHOICE {

 posSystemInformation-r16 PosSystemInformation-r16-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

 }

}

SystemInformation-IEs ::= SEQUENCE {

 sib-TypeAndInfo SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {

 sib2 SIB2,

 sib3 SIB3,

 sib4 SIB4,

 sib5 SIB5,

 sib6 SIB6,

 sib7 SIB7,

 sib8 SIB8,

 sib9 SIB9,

 ...,

 sib10-v1610 SIB10-r16,

 sib11-v1610 SIB11-r16,

 sib12-v1610 SIB12-r16,

 sib13-v1610 SIB13-r16,

 sib14-v1610 SIB14-r16,

 sibx-v17xy SIBx-r17

 },

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-SYSTEMINFORMATION-STOP

-- ASN1STOP

*<Next modification>*

### 6.3.1 System information blocks

*<Partially omitted>*

#### – *SIBx*

SIBx contains configurations of TRS resources for idle/inactive UEs.

*SIBx* information element

-- ASN1START

-- TAG-SIBx-START

SIBx-r17 ::= SEQUENCE {

 segmentNumber-r17 INTEGER (0..1),

 segmentType-r17 ENUMERATED {notLastSegment, lastSegment},

 segmentContainer-r17 OCTET STRING

}

SIBx-IEs-r17 ::= SEQUENCE {

 trs-ResouceSetConfig-r17 SEQUENCE (SIZE (1..maxNrofTRS-ResourceSets-r17)) OF TRS-ResourceSet-r17 OPTIONAL, -- Need R

 validityDuration-r17 ENUMERATED {1, 2, 4, 8, 16, 32, 64, 128, 256,512} OPTIONAL, -- Need S

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...

}

TRS-ResourceSet-r17 ::= SEQUENCE {

powerControlOffsetSS-r17 ENUMERATED{db-3, db0, db3, db6},

scramblingID-Info-r17 CHOICE {

scramblingIDforCommon-r17 ScramblingId,

scramblingIDperResourceListWith2-r17 SEQUENCE (SIZE (2)) OF ScramblingId,

scramblingIDperResourceListWith4-r17 SEQUENCE (SIZE (4)) OF ScramblingId,

...

 },

firstOFDMSymbolInTimeDomain-r17 INTEGER (0..9),

startingRB-r17 INTEGER (0..maxNrofPhysicalResourceBlocks-1),

nrofRBs-r17 INTEGER (24..maxNrofPhysicalResourceBlocksPlus1),

ssb-Index-r17 SSB-Index,

periodicityAndOffset-r17 CHOICE {

 slots10 INTEGER (0..9),

 slots20 INTEGER (0..19),

slots40 INTEGER (0..39),

slots80 INTEGER (0..79)

},

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

indBitID-r17 INTEGER (0..5),

nrofResources-r17 ENUMERATED{2,4},

...

}

-- TAG-SIBx-STOP

-- ASN1STOP

| *SIBx* field descriptions |
| --- |
| ***trs-ResouceSetConfig***RS configuration of TRS occasion(s) for idle/inactive UE(s), in terms of a list of N>=1 NZP TRS resource set(s). The maximum number of TRS resource sets configured by higher layer is 64. If a TRS resource is configured, the L1 based availability indication is always enabled based on that configuration. A UE which acquired SIB-X with a TRS configuration but did not yet receive an associated L1-based availability indication considers the configured TRS as unavailable. |
| ***TRS-ResourceSet***Common configuration parameters for the TRS resource set. |
| ***validityDuration***The valid time duration at least for a paging PDCCH based L1 availability indication, time unit is one default paging cycle. When the validity duration is not configured, UE assumes a default time duration to be 2 default paging cycle(s). |

| *TRS-ResourceSet* field descriptions |
| --- |
| ***firstOFDMSymbolInTimeDomain***The index of the first OFDM symbol in the PRB used for TRS in a slot. The field indicates first symbol in a slot, a second symbol in the same slot can be derived implicitly with symbol index as *firstOFDMSymbolInTimeDomain*+4. |
| ***frequencyDomainAllocation***Indicate the offset of the first RE to RE#0 in a RB in row1. |
| ***indBitID***The index of the associated bit in TRS availability indication field in DCI. Each TRS resource set is configured with an ID i for the association with (i+1)-th indication bit in TRS availability indication field in DCI. |
| ***nrofRBs***Number of PRBs across which corresponding TRS resource spans. |
| ***nrofResources***The number of TRS resources for a TRS resource set. |
| ***periodicityAndOffset***The periodicity and slot offset (slot) for periodicTRS. It is used to determine the location of the first slot of TRS resource set. The periodicity value *slots10* corresponds to 10 slots, value *slots20* corresponds to 20 slots, and so on. |
| ***powerControlOffsetSS***Power offset (dB) of NZP CSI-RS RE to SSS RE. |
| ***scramblingID-Info***One or more scrambling IDs are configured for a TRS resource set. If a common scrambling ID is configured, it applies to all the TRS resources within the TRS resource set. Otherwise, each TRS resource within the TRS resource set is provided with a scrambling ID. If the number of TRS resources for the TRS resource set is 2, *scramblingIDperResourceListWith2-r17* is configured, while *scramblingIDperResourceListWith4-r17* is configured for the case that the number of TRS resources for the TRS resource set is 4. |
| ***ssb-Index***The index of reference SSB with which quasi-collocation information is provided as specified in TS 38.214 subclause 5.1.5. |
| ***startingRB***The PRB index where corresponding TRS resource starts in relation to common resource block #0 (CRB#0) on the common resource block grid. |

*<Next modification>*

### 6.3.2 Radio resource control information elements

*<Partially omitted>*

#### – *CellGroupConfig*

The *CellGroupConfig* IE is used to configure a master cell group (MCG) or secondary cell group (SCG). A cell group comprises of one MAC entity, a set of logical channels with associated RLC entities and of a primary cell (SpCell) and one or more secondary cells (SCells).

*CellGroupConfig* information element

-- ASN1START

-- TAG-CELLGROUPCONFIG-START

-- Configuration of one Cell-Group:

CellGroupConfig ::= SEQUENCE {

 cellGroupId CellGroupId,

 rlc-BearerToAddModList SEQUENCE (SIZE(1..maxLC-ID)) OF RLC-BearerConfig OPTIONAL, -- Need N

 rlc-BearerToReleaseList SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentity OPTIONAL, -- Need N

 mac-CellGroupConfig MAC-CellGroupConfig OPTIONAL, -- Need M

 physicalCellGroupConfig PhysicalCellGroupConfig OPTIONAL, -- Need M

 spCellConfig SpCellConfig OPTIONAL, -- Need M

 sCellToAddModList SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellConfig OPTIONAL, -- Need N

 sCellToReleaseList SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellIndex OPTIONAL, -- Need N

 ...,

 [[

 reportUplinkTxDirectCurrent ENUMERATED {true} OPTIONAL -- Cond BWP-Reconfig

 ]],

 [[

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

 bh-RLC-ChannelToAddModList-r16 SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelConfig-r16 OPTIONAL, -- Need N

 bh-RLC-ChannelToReleaseList-r16 SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelID-r16 OPTIONAL, -- Need N

 f1c-TransferPath-r16 ENUMERATED {lte, nr, both} OPTIONAL, -- Need M

 simultaneousTCI-UpdateList1-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 simultaneousTCI-UpdateList2-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 simultaneousSpatial-UpdatedList1-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 simultaneousSpatial-UpdatedList2-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 uplinkTxSwitchingOption-r16 ENUMERATED {switchedUL, dualUL} OPTIONAL, -- Need R

 uplinkTxSwitchingPowerBoosting-r16 ENUMERATED {enabled} OPTIONAL -- Need R

 ]],

 [[

 reportUplinkTxDirectCurrentTwoCarrier-r16 ENUMERATED {true} OPTIONAL -- Need N

}

-- Serving cell specific MAC and PHY parameters for a SpCell:

SpCellConfig ::= SEQUENCE {

 servCellIndex ServCellIndex OPTIONAL, -- Cond SCG

 reconfigurationWithSync ReconfigurationWithSync OPTIONAL, -- Cond ReconfWithSync

 rlf-TimersAndConstants SetupRelease { RLF-TimersAndConstants } OPTIONAL, -- Need M

 rlmInSyncOutOfSyncThreshold ENUMERATED {n1} OPTIONAL, -- Need S

spCellConfigDedicated ServingCellConfig OPTIONAL, -- Need M

 ... ,

[[

 lowMobilityEvaluationConnected-r17 SEQUENCE {

 s-SearchDeltaP-Connected-r17 ENUMERATED {FFS},

 t-SearchDeltaP-Connected-r17 ENUMERATED {FFS}

 } OPTIONAL, -- Need R

goodServingCellEvaluationRLM-r17 GoodServingCellEvaluation-r17 OPTIONAL, -- Need R

goodServingCellEvaluationBFD-r17 GoodServingCellEvaluation-r17 OPTIONAL, -- Need R

]]

}

GoodServingCellEvaluation-r17 ::=      SEQUENCE {

offset-r17 CHOICE {

offsetFR1-r17 ENUMERATED {2, 4, 6, 8},

 offsetFR2-r17 ENUMERATED {2, 4, 6, 8}

} OPTIONAL -- Need S

}

ReconfigurationWithSync ::= SEQUENCE {

 spCellConfigCommon ServingCellConfigCommon OPTIONAL, -- Need M

 newUE-Identity RNTI-Value,

 t304 ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000},

 rach-ConfigDedicated CHOICE {

 uplink RACH-ConfigDedicated,

 supplementaryUplink RACH-ConfigDedicated

 } OPTIONAL, -- Need N

 ...,

 [[

 smtc SSB-MTC OPTIONAL -- Need S

 ]],

 [[

 daps-UplinkPowerConfig-r16 DAPS-UplinkPowerConfig-r16 OPTIONAL -- Need N

 ]]

}

DAPS-UplinkPowerConfig-r16 ::= SEQUENCE {

 p-DAPS-Source-r16 P-Max,

 p-DAPS-Target-r16 P-Max,

 uplinkPowerSharingDAPS-Mode-r16 ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic }

}

SCellConfig ::= SEQUENCE {

 sCellIndex SCellIndex,

 sCellConfigCommon ServingCellConfigCommon OPTIONAL, -- Cond SCellAdd

 sCellConfigDedicated ServingCellConfig OPTIONAL, -- Cond SCellAddMod

 ...,

 [[

 smtc SSB-MTC OPTIONAL -- Need S

 ]],

 [[

 sCellState-r16 ENUMERATED {activated} OPTIONAL, -- Cond SCellAddSync

 secondaryDRX-GroupConfig-r16 ENUMERATED {true} OPTIONAL -- Cond DRX-Config2

]],

[[

goodServingCellEvaluationBFD-r17 GoodServingCellEvaluation-r17                             OPTIONAL, -- Need R

]]

}

-- TAG-CELLGROUPCONFIG-STOP

-- ASN1STOP

Editor’s NOTE: Whether serving cell quality criterion is configured per Scell for BFD needs RAN4 confirmation.

Editor’s NOTE: Current text assumes the low mobility criterion is configured commonly for RLM and BFD. It is FFS whether the low mobility criterion can be configured independently for RLM and BFD.

Editor’s NOTE: Values and range of *SearchDeltaP-Connected* and *t-SearchDeltaP-Connected* are still FFS in RAN4.

|  |
| --- |
| *CellGroupConfig* field descriptions |
| ***bap-Address***BAP address of the parent node in cell group. |
| ***bh-RLC-ChannelToAddModList***Configuration of the backhaul RLC entities and the corresponding MAC Logical Channels to be added and modified. |
| ***bh-RLC-ChannelToReleaseList***List of the backhaul RLC entities and the corresponding MAC Logical Channels to be released. |
| ***f1c-TransferPath***The F1-C transfer path that an EN-DC IAB-MT should use for transferring F1-C packets to the IAB-donor-CU. If IAB-MT is configured with *lte*, IAB-MT can only use LTE leg for F1-C transfer. If IAB-MT is configured with *nr*, IAB-MT can only use NR leg for F1-C transfer. If IAB-MT is configured with *both*, it is up to IAB-MT to select an LTE leg or a NR leg for F1-C transfer. If the field is not configured, the IAB node uses the NR leg as the default one. |
| ***mac-CellGroupConfig***MAC parameters applicable for the entire cell group. |
| ***rlc-BearerToAddModList***Configuration of the MAC Logical Channel, the corresponding RLC entities and association with radio bearers. |
| ***reportUplinkTxDirectCurrent***Enables reporting of uplink and supplementary uplink Direct Current location information upon BWP configuration and reconfiguration. This field is only present when the BWP configuration is modified or any serving cell is added or removed. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. If UE is configured with SUL carrier, UE reports both UL and SUL Direct Current locations. |
| ***reportUplinkTxDirectCurrentTwoCarrier***Enables reporting of uplink Direct Current location information when the UE is configured with uplink intra-band CA with two carriers. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. |
| ***rlmInSyncOutOfSyncThreshold***BLER threshold pair index for IS/OOS indication generation, see TS 38.133 [14], table 8.1.1-1. *n1* corresponds to the value 1. When the field is absent, the UE applies the value 0. Whenever this is reconfigured, UE resets N310 and N311, and stops T310, if running. Network does not include this field. |
| ***sCellState***Indicates whether the SCell shall be considered to be in activated state upon SCell configuration. |
| ***sCellToAddModList***List of secondary serving cells (SCells) to be added or modified. |
| ***sCellToReleaseList***List of secondary serving cells (SCells) to be released. |
| ***secondaryDRX-GroupConfig***The field is used to indicate whether the SCell belongs to the secondary DRX group. All serving cells in the secondary DRX group shall belong to one Frequency Range and all serving cells in the legacy DRX group shall belong to another Frequency Range. |
| ***simultaneousTCI-UpdateList1, simultaneousTCI-UpdateList2***List of serving cells which can be updated simultaneously for TCI relation with a MAC CE. The *simultaneousTCI-UpdateList1* and *simultaneousTCI-UpdateList2* shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the *coresetPoolIndex* in these lists. |
| ***simultaneousSpatial-UpdatedList1, simultaneousSpatial-UpdatedList2***List of serving cells which can be updated simultaneously for spatial relation with a MAC CE. The *simultaneousSpatial-UpdatedList1* and *simultaneousSpatial-UpdatedList2* shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the *coresetPoolIndex* in these lists. |
| ***spCellConfig***Parameters for the SpCell of this cell group (PCell of MCG or PSCell of SCG).  |
| ***uplinkTxSwitchingOption***Indicates which option is configured for dynamic UL Tx switching for inter-band UL CA or (NG)EN-DC. The field is set to *switchedUL* if network configures option 1 as specified in TS 38.214 [19], or *dualUL* if network configures option 2 as specified in TS 38.214 [19]. Network always configures UE with a value for this field in inter-band UL CA case and (NG)EN-DC case where UE supports dynamic UL Tx switching. |
| ***uplinkTxSwitchingPowerBoosting***Indicates whether the UE is allowed to enable 3dB boosting on the maximum output power for transmission on carrier2 under the operation state in which 2-port transmission can be supported on carrier2 for inter-band UL CA case with dynamic UL Tx switching as defined in TS 38.101-1 [15]. Network can only configure this field for dynamic UL Tx switching in inter-band UL CA case with power Class 3 as defined in TS 38.101-1 [15]. |

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| *DAPS-UplinkPowerConfig* field descriptions |
| ***p-DAPS-Source***The maximum total transmit power to be used by the UE in the source cell group during DAPS handover. |
| ***p-DAPS-Target***The maximum total transmit power to be used by the UE in the target cell group during DAPS handover. |
| ***uplinkPowerSharingDAPS-Mode***Indicates the uplink power sharing mode that the UE uses in DAPS handover (see TS 38.213 [13]). |

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| *GoodServingCellEvaluation* field descriptions |
| ***offset***The parameter “X” (dB) for the good serving cell quality criterion in RRC\_CONNECTED, for a cell operating in FR1 and FR2, respectively. If this field is absent, the UE applies the (default) value of [0] dB for “X”. |

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| *ReconfigurationWithSync* field descriptions |
| ***rach-ConfigDedicated***Random access configuration to be used for the reconfiguration with sync (e.g. handover). The UE performs the RA according to these parameters in the *firstActiveUplinkBWP* (see *UplinkConfig*). |
| ***smtc***The SSB periodicity/offset/duration configuration of target cell for NR PSCell change and NR PCell change. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *spCellConfigCommon*.For case of NR PCell change, the *smtc* is based on the timing reference of (source) PCell. For case of NR PSCell change, it is based on the timing reference of source PSCell.If both this field and *targetCellSMTC-SCG* 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. |

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| *SCellConfig* field descriptions |
| *goodServingCellEvaluationBFD*Indicates the criterion for a UE to detect the good serving cell quality for BFD relaxation in an SCell in RRC\_CONNECTED. |
| ***smtc***The SSB periodicity/offset/duration configuration of target cell for NR SCell addition. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *sCellConfigCommon*. The *smtc* is based on the timing of the SpCell of associated cell group. In case of inter-RAT handover to NR, the timing reference is the NR PCell. In case of intra-NR PCell change (standalone NR) or NR PSCell change (EN-DC), the timing reference is the target SpCell. If the field is 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. |

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| *SpCellConfig* field descriptions |
| *goodServingCellEvaluationBFD*Indicates the criterion for a UE to detect the good serving cell quality for BFD relaxation in the SpCell in RRC\_CONNECTED. The field is always configured when the network enables BFD relaxation for the UE. |
| *goodServingCellEvaluationRLM*Indicates the criterion for a UE to detect the good serving cell quality for RLM relaxation in the SpCell in RRC\_CONNECTED. The field is always configured when the network enables RLM relaxation for the UE. |
| ***lowMobilityEvaluationConnected***Indicates the criterion for a UE to detect low mobility in RRC\_CONNECTED in an SpCell. The *s-SearchDeltaP-Connected* is the parameter "SSearchDeltaP-connected". And the *t-SearchDeltaP-Connected* is the parameter " TSearchDeltaP-Connected". Low mobility criterion is configured in NR Pcell for the case of NR SA/ NR CA/ NE-DC/NR-DC, and in the NR PSCell for the case of EN-DC. |
| ***reconfigurationWithSync***Parameters for the synchronous reconfiguration to the target SpCell. |
| ***rlf-TimersAndConstants***Timers and constants for detecting and triggering cell-level radio link failure. For the SCG, *rlf-TimersAndConstants* can only be set to *setup* and is always included at SCG addition. |
| ***servCellIndex***Serving cell ID of a PSCell. The PCell of the Master Cell Group uses ID = 0. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *BWP-Reconfig* | The field is optionally present, Need N, if the BWPs are reconfigured or if serving cells are added or removed. Otherwise it is absent.  |
| *DRX-Config2* | The field is optionally present, Need N, if *drx-ConfigSecondaryGroup* is configured. It is absent otherwise. |
| *ReconfWithSync* | The field is mandatory present in the *RRCReconfiguration* message:- in each configured *CellGroupConfig* for which the SpCell changes,- in the *masterCellGroup:*- at change of AS security key derived from KgNB,- in an *RRCReconfiguration* message contained in a *DLInformationTransferMRDC* message,- in the *secondaryCellGroup* at:- PSCell addition,- SCG resume with NR-DC or (NG)EN-DC,- update of required SI for PSCell,- change of AS security key derived from S-KgNB in NR-DC while the UE is configured with at least one radio bearer with *keyToUse* set to *secondary* and that is not released by this *RRCReconfiguration* message,- MN handover in (NG)EN-DC.Otherwise, it is optionally present, need M. The field is absent in the *masterCellGroup* in *RRCResume* and *RRCSetup* messages and is absent in the *masterCellGroup* in *RRCReconfiguration* messages if source configuration is not released during DAPS handover. |
| *SCellAdd* | The field is mandatory present upon SCell addition; otherwise it is absent, Need M. |
| *SCellAddMod* | The field is mandatory present upon SCell addition; otherwise it is optionally present, need M. |
| *SCellAddSync* | The field is optionally present, Need N, in case of SCell addition, reconfiguration with sync, and resuming an RRC connection. It is absent otherwise. |
| *SCG* | The field is mandatory present in an *SpCellConfig* for the PSCell. It is absent otherwise.  |

NOTE: In case of change of AS security key derived from S-KgNB/S-KeNB, if *reconfigurationWithSync* is not included in the *masterCellGroup*, the network releases all existing MCG RLC bearers associated with a radio bearer with *keyToUse* set to *secondary*. In case of change of AS security key derived from KgNB/KeNB, if *reconfigurationWithSync* is not included in the *secondaryCellGroup*, the network releases all existing SCG RLC bearers associated with a radio bearer with *keyToUse* set to *primary*.

*<Next modification>*

#### – *DownlinkConfigCommonSIB*

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

*DownlinkConfigCommonSIB* information element

-- ASN1START

-- TAG-DOWNLINKCONFIGCOMMONSIB-START

DownlinkConfigCommonSIB ::= SEQUENCE {

 frequencyInfoDL FrequencyInfoDL-SIB,

 initialDownlinkBWP BWP-DownlinkCommon,

 bcch-Config BCCH-Config,

 pcch-Config PCCH-Config,

...,

[[

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

]]

}

BCCH-Config ::= SEQUENCE {

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

 ...

}

PCCH-Config ::= SEQUENCE {

 defaultPagingCycle PagingCycle,

 nAndPagingFrameOffset CHOICE {

 oneT NULL,

 halfT INTEGER (0..1),

 quarterT INTEGER (0..3),

 oneEighthT INTEGER (0..7),

 oneSixteenthT INTEGER (0..15)

 },

 ns ENUMERATED {four, two, one},

 firstPDCCH-MonitoringOccasionOfPO CHOICE {

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

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

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

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

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

 sCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..4479),

 sCS120KHZoneEighthT-SCS60KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..8959),

 sCS120KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..17919)

 } OPTIONAL, -- Need R

 ...,

 [[

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

 ]]

}

PEI-Config-r17 ::= SEQUENCE {

pei-SearchSpace-r17 SearchSpaceId,

po-NumPerPEI-r17 ENUMERATED {1, 2, 4, 8},

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

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

firstPDCCH-MonitoringOccasionOfPEI-O-r17 CHOICE {

 sCS15KHZoneT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..139),

 sCS30KHZoneT-SCS15KHZhalfT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..279),

 sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..559),

 sCS120KHZoneT-SCS60KHZhalfT-SCS30KHZquarterT-SCS15KHZoneEighthT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..1119),

 sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZoneEighthT-SCS15KHZoneSixteenthT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..2239),

 sCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..4479),

 sCS120KHZoneEighthT-SCS60KHZoneSixteenthT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..8959),

 sCS120KHZoneSixteenthT-r17 SEQUENCE (SIZE (1..maxPEI-perPF)) OF INTEGER (0..17919)

 },

subgroupConfig-r17 SubgroupConfig-r17

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

...

}

SubgroupConfig-r17 ::= SEQUENCE {

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

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

...

}

-- TAG-DOWNLINKCONFIGCOMMONSIB-STOP

-- ASN1STOP

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| --- |
| *DownlinkConfigCommonSIB* field descriptions |
| ***bcch-Config***The modification period related configuration. |
| ***frequencyInfoDL-SIB***Basic parameters of a downlink carrier and transmission thereon. |
| ***initialDownlinkBWP***The initial downlink BWP configuration for a PCell. The network configures the *locationAndBandwidth* so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain. The UE applies the *locationAndBandwidth* upon reception of this field (e.g. to determine the frequency position of signals described in relation to this *locationAndBandwidth*) but it keeps CORESET#0 until after reception of *RRCSetup*/*RRCResume/RRCReestablishment*. |
| ***lastUsedCellOnly***When present, the field indicates that the UE monitors PEI only if its last connection was released by this cell. A PEI-capable UE stores its last used cell information. |
| ***nrofPDCCH-MonitoringOccasionPerSSB-InPO***The number of PDCCH monitoring occasions corresponding to an SSB within a Paging Occasion, see TS 38.304 [20], clause 7.1. |
| ***pcch-Config***The paging related configuration. |
| ***pei-Config***The PEI related configuration. |
| ***subgroupConfig***The paging subgroup related configuration. |

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

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

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| *PEI-Config* field descriptions |
| *firstPDCCH-MonitoringOccasionOfPEI-O-r17*Offset, in number of symbols, from the start of the reference frame for PEI-O to the start of the first PDCCH monitoring occasion of PEI-O, see TS 38.213 [13], clause 10.4A. For the case *po-NumPerPEI* is smaller than Ns, UE applies the (floor(i\_s/poNumPerPEI)+1)-th value out of (N\_s/po-NumPerPEI) configured values in *firstPDCCH-MonitoringOccasionOfPEI-O* for the symbol-level offset. When *po-NumPerPEI* is one or mutliple of Ns, UE applies the first configured value in *firstPDCCH-MonitoringOccasionOfPEI-O* for the symbol-level offset. |
| *payloadSizeDCI-2-7*Payload size of PEI DCI, i.e., DCI format 2\_7. The size is no larger than the payload size of paging DCI which has maximum of 41 bits and 43 bits for licensed and unlicensed spectrums, respectively. |
| *pei-FrameOffset*Offset, in number of frames from the start of a first paging frame of the paging frames associated with the PEI-O to the start of a reference frame for PEI-O, see TS 38.213 [13], clause 10.4A. |
| ***pei-SearchSpace***ID of dedicated search space for PEI. It can be configured to one of up to 4 common SS sets configured by *commonSearchSpaceList* with *SearchSpaceId* > 0. The CCE aggregation levels and maximum number of PDCCH candidates per CCE aggregation level follows Table 10.1-1 of TS38.213 [13]. SearchSpaceId = 0 can be configured for the case of CORESET multiplexing pattern 2 or 3. |
| ***po-NumPerPEI***The number of PO(s) associated with one PEI monitoring occation. It is a factor of N x Ns (total PO number in a paging cycle). The Maximum number of PF associated with one PEI monitoring occation is up to 2. The number of PO mapping to one PEI should be multiple of Ns when po-NumPerPEI is larger than Ns. |

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| *SubgroupConfig* field descriptions |
| ***subgroupsNumPerPO***Total number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling The field represents the sum of CN-assigned and UEID-based subgroups supported by the network. |
| ***subgroupsNumForUEID***Number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling, for UEID-based subgrouping method. When present, the fieldis set to an integer smaller than or equal to *subgroupsNumPerPO*s*. subgroupsNumPerPO* equals to *subgroupsNumForUEID* when the network does not support CN-assigned subgrouping. The field is absent when the network does not support UEID-based subgrouping. Both this field and *subgroupsNumPerPO* are equal to 1 when the network does not support subgrouping. |

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

*<Next modification>*

#### – *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

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 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

]],

[[

searchSpacesToAddModListExt-v17xy SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-v17xy OPTIONAL, -- Need N

searchSpaceSwitchTimer-r17 INTEGER (1..800) OPTIONAL, -- Need M

pdcch-SkippingDurationList-r17 SEQUENCE(SIZE (1..3)) OF PDCCH-SkippingDuration-r17 OPTIONAL, -- Need M

]]

}

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

PDCCH-SkippingDuration-r17 ::= INTEGER (1..800)

-- TAG-PDCCH-CONFIG-STOP

-- ASN1STOP

Editor’s NOTE: It is FFS whether SSSG switching or PDCCH skipping is only applicable when C-DRX is configured. Wait for further RAN1 clarification.

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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). |
| ***pdcch-SkippingDurationList***The UE can be configured to be indicated by DCI a value of X (i.e., skipping duration), in units of slots, among at most 3 multiple RRC configured values by scheduling DCIs indicating PDCCH schedules data. For each skipping duration (i.e. the value range of IE *PDCCH-SkippingDuration-r17*), {1,2,3,…,20,30, 40, 50, 60, 80, 100} are valid for the 15 kHz SCS, {1,2,3,…,40, 60, 80, 100, 120,160,200} are valid for 30 kHz SCS, {1,2,3,…,80, 120, 160, 200, 240, 320,400} are valid for 60kHz SCS, and {1,2,3,…,160, 240, 320,400, 480, 640,800} are valid for 120kHz SCS , {4,8,12,…,640, 960, 1280,1600, 1920, 2560,3200} are valid for 480kHz SCS, and {8,16,24,…,1280, 1920, 2560,3200, 3840, 5120,6400} are valid for 960kHz SCS. |
| ***searchSpacesToAddModList, searchSpacesToAddModListExt-r16, searchSpacesToAddModListExt-v17xy***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-r16, it includes the same number of entries, and listed in the same order, as in searchSpacesToAddModList. |
| ***searchSpaceSwitchTimer***Timer (in unit of slots) to control the UE behavior to switch from search space group X back to search space group 0, as specified in clause 10 of TS 38.213. A UE does not expect to be configured with Rel-16 SSSG switching parameters and Rel-17 SSSG switching parameters per cell simultaneously. For 15 kHz SCS, {1,2,3,…,20,30, 40, 50, 60, 80, 100} are valid. For 30 kHz SCS, {1,2,3,…,40, 60, 80, 100, 120,160,200} are valid. For 60kHz SCS, {1,2,3,…,80, 120, 160, 200, 240, 320,400} are valid. For 120kHz SCS, {1,2,3,…,160, 240, 320,400, 480, 640,800} are valid. For 480kHz SCS, {4,8,12,…,640, 960, 1280,1600, 1920, 2560,3200} are valid. For 960kHz SCS, {8,16,24,…,1280, 1920, 2560,3200, 3840, 5120,6400} are valid. |
| ***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). |

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| *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.* |

*<Next modification>*

– *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 Setup

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

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

 nrofCandidates SEQUENCE {

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

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

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

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

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

 } OPTIONAL, -- Cond Setup

 searchSpaceType CHOICE {

 common SEQUENCE {

 dci-Format0-0-AndFormat1-0 SEQUENCE {

 ...

 } OPTIONAL, -- Need R

 dci-Format2-0 SEQUENCE {

 nrofCandidates-SFI SEQUENCE {

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

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

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

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

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

 },

 ...

 } OPTIONAL, -- Need R

 dci-Format2-1 SEQUENCE {

 ...

 } OPTIONAL, -- Need R

 dci-Format2-2 SEQUENCE {

 ...

 } OPTIONAL, -- Need R

 dci-Format2-3 SEQUENCE {

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

 dummy2 ENUMERATED {n1, n2},

 ...

 } OPTIONAL -- Need R

 },

 ue-Specific SEQUENCE {

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

 ...,

 [[

 dci-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

 ...,

 [[

 dci-Format2-7-r17 SEQUENCE {

 nrofCandidates-PEI-r17 SEQUENCE {

 aggregationLevel4-r17 ENUMERATED {n0, n1, n2, n3, n4} OPTIONAL, -- Need R

 aggregationLevel8-r17 ENUMERATED {n0,n1, n2} OPTIONAL, -- Need R

 aggregationLevel16-r17 ENUMERATED {n0, n1} OPTIONAL, -- Need R

 },

...

 } 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

}

SearchSpaceExt-v17xy ::= SEQUENCE {

 searchSpaceId-r17 SearchSpaceId,

searchSpaceGroupIdList-r17 SEQUENCE (SIZE (1.. 3)) OF INTEGER (0.. maxNrofSearchSpaceGroups-r17-1) 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). |
| ***monitoringSymbolsWithinSlot***The first symbol(s) for PDCCH monitoring in the slots configured for PDCCH monitoring (see *monitoringSlotPeriodicityAndOffset* and *duration*). The most significant (left) bit represents the first OFDM in a slot, and the second most significant (left) bit represents the second OFDM symbol in a slot and so on. The bit(s) set to one identify the first OFDM symbol(s) of the control resource set within a slot. If the cyclic prefix of the BWP is set to extended CP, the last two bits within the bit string shall be ignored by the UE 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-PEI***The number of PDCCH candidates specifically for format 2-7 for the configured aggregation level. |
| ***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. If *searchSpaceGroupIdList* (i.e. without suffix) is included. The network configures at most 3 search space groups per BWP where the group ID is either 0, 1 or 2 if *searchSpaceGroupIdList-r17* is included. And if *searchSpaceGroupIdList-r17* is included, *searchSpaceGroupIdList* (i.e. without suffix) is ignored. |
| ***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. |
| *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. |

*<Next modification>*

#### – *SI-SchedulingInfo*

The IE *SI-SchedulingInfo* contains information needed for acquisition of SI messages.

*SI-SchedulingInfo* information element

-- ASN1START

-- TAG–SI-SCHEDULINGINFO-START

SI-SchedulingInfo ::= SEQUENCE {

 schedulingInfoList SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo,

 si-WindowLength ENUMERATED {s5, s10, s20, s40, s80, s160, s320, s640, s1280},

 si-RequestConfig SI-RequestConfig OPTIONAL, -- Cond MSG-1

 si-RequestConfigSUL SI-RequestConfig OPTIONAL, -- Cond SUL-MSG-1

 systemInformationAreaID BIT STRING (SIZE (24)) OPTIONAL, -- Need R

 ...

}

SchedulingInfo ::= SEQUENCE {

 si-BroadcastStatus ENUMERATED {broadcasting, notBroadcasting},

 si-Periodicity ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},

 sib-MappingInfo SIB-Mapping

}

SIB-Mapping ::= SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo

SIB-TypeInfo ::= SEQUENCE {

 type ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType6, sibType7, sibType8, sibType9,

 sibType10-v1610, sibType11-v1610, sibType12-v1610, sibType13-v1610, sibType14-v1610,

 sibTypex-v17xy, spare2, spare1,... },

 valueTag INTEGER (0..31) OPTIONAL, -- Cond SIB-TYPE

 areaScope ENUMERATED {true} OPTIONAL -- Need S

}

-- TAG-SI-SCHEDULINGINFO-STOP

-- ASN1STOP

|  |
| --- |
| *SchedulingInfo* field descriptions |
| ***areaScope***Indicates that a SIB is area specific. If the field is absent, the SIB is cell specific. |
| ***si-BroadcastStatus***Indicates if the SI message is being broadcasted or not. Change of *si-BroadcastStat*us should not result in system information change notifications in Short Message transmitted with P-RNTI over DCI (see clause 6.5). The value of the indication is valid until the end of the BCCH modification period when set to *broadcasting*. |
| ***si-Periodicity***Periodicity of the SI-message in radio frames. Value *rf8* corresponds to 8 radio frames, value *rf16* corresponds to 16 radio frames, and so on. |

|  |
| --- |
| *SI-SchedulingInfo* field descriptions |
| ***si-RequestConfig***Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to notBroadcasting. |
| ***si-RequestConfigSUL***Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to notBroadcasting. |
| ***si-WindowLength***The length of the SI scheduling window. Value *s5* corresponds to 5 slots, value *s10* corresponds to 10 slots and so on. The network always configures *si-WindowLength* to be shorter than or equal to the *si-Periodicity*. |
| ***systemInformationAreaID***Indicates the system information area that the cell belongs to, if any. Any SIB with *areaScope* within the SI is considered to belong to this *systemInformationAreaID*. The systemInformationAreaID is unique within a PLMN/SNPN. |

| Conditional presence | Explanation |
| --- | --- |
| *MSG-1* | The field is optionally present, Need R, if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *SchedulingInfo*. It is absent otherwise. |
| *SIB-TYPE* | The field is mandatory present if the SIB type is different from *SIB6*, *SIB7* or *SIB8*. For *SIB6*, *SIB7* and *SIB8* it is absent. |
| *SUL-MSG-1* | The field is optionally present, Need R, if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB* and if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *SchedulingInfo*. It is absent otherwise. |

*<Next modification>*

## 6.4 RRC multiplicity and type constraint values

### – Multiplicity and type constraint definitions

-- ASN1START

-- 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

maxPEI-perPF INTEGER ::= 4 -- Maximum number of PEI 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)

maxDCI-2-6-Size-r16 INTEGER ::= 140 -- Maximum size of DCI format 2-6

maxDCI-2-7-Size-r17 INTEGER ::= 43 -- Maximum size of DCI format 2-7

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 --

maxNrofPagingSubgroups-r17 INTEGER ::= 8 -- Maximum number of paging subgroups per paging occasion

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

maxNrofTRS-ResourceSets-r17 INTEGER ::= 64 -- Maximum number of TRS resource sets

maxNrofSearchSpaceGroups-r17 INTEGER ::= 3 -- Maximum number of search space groups

-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-STOP

-- ASN1STOP

*End of Changes*

# List of open issues

Editor’s NOTE: Whether serving cell quality criterion is configured per Scell for BFD is pending RAN4 input.

Editor’s NOTE: Current text assumes the low mobility criterion is configured commonly for RLM and BFD. It is FFS whether the low mobility criterion can be configured independently for RLM and BFD.

Editor’s NOTE: Values and range of *SearchDeltaP-Connected* and *t-SearchDeltaP-Connected* are still FFS in RAN4.

Editor’s NOTE: It is FFS whether SSSG switching or PDCCH skipping is only applicable when C-DRX is configured. Wait for further RAN1 clarification.

# RAN2 agreements on R17 power saving

## **Green highlight – agreement captured in stage-3 specification**

## **Blue highlight – agreement captured as editor’s notes**

## **No highlight – agreement with no direct impact on this specification**

## **RAN2#117-e agreements**

* Not sufficient support to introduce any special functionality for UEs in eDRX. Rely on UE determination on whether he has up to date information or not. Can think about whether clarification is needed.
* The configuration for RLM relaxation feature and BFD relaxation feature are provided in *SpCellConfig* and *SpCellConfig/ScellConfig*, respectively.
* Low mobility criterion is configured in NR Pcell for the case of NR SA/ NR CA/ NE-DC/NR-DC, and in the NR PSCell for the case of EN-DC.
* Introduce optional parameter(s) of offset on Qx (Qin for RLM relaxation and FFS for BFD relaxation) for good serving cell quality criterion in dedicated signaling. If the offset is absent, a pre-defined value is used (e.g. FFS [0dB]). FFS on stage-3 details (i.e. value range of parameters).
* Serving cell quality criterion is configured provided in PCell/PScell for RLM relaxation and in PCell/PScell for BFD relaxation (regarding Scell waiting for R4 input)

**RAN2 clarifications to earlier RAN2 decisions:**

* P1: UE ignores PDCCH skipping on all serving cells of the corresponding CG while SR is pending (FFS if “all” can be further restricted).
* P2: If PDCCH skipping is applied to RNTI(s) monitored during RAR/MsgB window, UE ignores PDCCH skipping on SpCell.
* P3: UE ignores PDCCH skipping on SpCell while contention resolution timer is running.

Working Agreement:

* UE can start/stop RLM/BFD relaxation by itself if it meets/fails the relaxation criteria.
* The feature is configured by RRC dedicated signalling, this is the only enable disable function that is supported.
* PEI + UEID subgrouping is one capability
* gNB does not need to know the UE capability for TRS/CSI-RS in idle and inactive mode. Introduce R1 29-2 as optional without capability signalling
* Introduce 2 separate capability bits for RLM relaxation feature and for BFD relaxation feature
* The capability bit(s) for RLM and BFD relaxation shall be per UE with FR differentiation
* Network indicates whether UE monitors PEI in last used cell in system information.
* A UE which acquired SIB-X with a TRS/CSI-RS configuration but didn’t yet receive an associated L1-based availability indication considers the configured TRS/CSI-RS as “unavailable”.
* RAN2 reuses the existing mechanism used for SIB12 for implementing the SIBX segmentation
* A PEI-capable UE stores its “last used cell” information. FFS how to capture this in the specifications
* Do not introduce an associated timer for the “last used cell” information stored by UE
* The “lastUsedCellOnly” indication is a cell-level configuration and there is no per-subgroup indication
* Introduce a one-bit indication of *lastUsedCellOnly* in PEI-Config.
* RAN2 clarifies the meaning of “last used cell only”: When a cell broadcasts “last used cell only”, a UE monitors PEI only if its last connection was released by this cell.
* A PEI-capable UE must support at least UEID-based subgrouping method.
* RAN2 confirms that “PEI without subgrouping” can be implemented by configuring PEI plus UEID subgrouping with one subgroup.
* “PEI without subgrouping” can be configured by only one method.
* When PEI is applied with eDRX, the UEID for UEID-based subgrouping is determined by 5G-S-TMSI mod 32768.
* No special handling or configuration is introduced for PEI monitoring with PTW (i.e., PEI is applicable to each PO within PTW).
* Send an informative LS to RAN3/SA2/CT1 for RAN2 agreements about PEI and paging subgrouping and ask question about mismatched understanding of “last cell” between network and UE.
* If a UE cannot find its subgroup ID with the PEI configurations in a cell, it monitors legacy paging.
* A UE with CN-assigned subgroup ID should derive UEID-based subgroup ID in a cell supporting only UEID-based subgrouping.

## **RAN2#116bis-e agreements**

* RAN configuration (of subgrouping) includes the two parameters Nsg-UEID (number of UEID-based subgroups) and *subgroupsNumPerPO* (total number of subgroups in a PO):

- If only CN-assigned subgrouping is used, *subgroupsNumPerPO* is present (the value then equals to the number of CN-assigned subgroups), and Nsg-UEID is absent.

- If only UEID-based subgrouping is used, *subgroupsNumPerPO* and Nsg-UEID are present, and Nsg-UEID has the same value as *subgroupsNumPerPO*.

- If both subgrouping methods are used, both *subgroupsNumPerPO* and Nsg-UEID are present, and 0 < Nsg-UEID < *subgroupsNumPerPO*.

* RAN2 aims to Support PEI and subgrouping with eDRX. FFS the impact.
* RAN2 assumes that there is no particular impact to Uu signalling to support RAN sharing. It is further assumed that Core Networks must have consistent policy if subgrouping is used by multiple Core Networks.
* RAN2 assumes that PEI can be used “without” subgrouping. FFS whether the bits in the PEI for subgrouping then need to have any particular meaning, or whether this would be done by just having one subgroup.
* RAN2 assumes that PEI monitoring can not be specifically enabled/disabled for individual UEs.
* PEI subgroup indices are allocated to CN-assigned subgroups first. The 1st bit in the PEI bitmap corresponds to the CN-assigned subgroup #1, 2nd bit in the bitmap corresponds to the CN-assigned subgroup #2, and so on. After CN-assigned subgroups, the subsequent bits, if any, correspond to the UEID-based subgroup #1, #2, and so on.
* Both *subgroupNumPerPO* and Nsg-UEID range from 1 to 8.
* If network supports PEI but not subgrouping, the whole *SubgroupConfig-r17* is absent. The parameter *subgroupsNumPerPO* is mandatory present if *subgroupConfig-r17* is configured.
* UE is configured to monitor PEI, either only in the last used cell or any other cells (after cell reselection). FFS how the configuration is provided in [SI, RRCRelease, or NAS message].
* If a cell supports both UE identity based and CN assigned subgrouping, for UEID based paging subgrouping, UE belongs to k-th paging subgroup, where

- k = [floor (UE Identity/(N\*Ns)) mod Nsg-UEID] + Nsg-CN,

- N is the number of Paging frames,

- Ns is the number of POs per paging frame,

- Nsg-UEID is the number of UEID-based paging subgroups, and

- Nsg-CN is the number of CN assigned paging subgroups (= subgroupNumPerPO - Nsg-UEID).

* The number of bits N in the bitmap used for L1 availability indication is derived implicitly from the number of different values of *indBitID*. There is no need for an explicit parameter.
* RAN2 confirm TRS/CSI-RS can be applied to eDRX UEs.
* Confirm that there will be no particular mechanism for availability indication based on SIB (beyond the presence of the RS configuration)
* A UE which acquired SIB-X with a TRS/CSI-RS configuration but didn’t yet receive an associated L1-based availability indication considers the configured TRS/CSI-RS as FFS: “unavailable” or “available”.
* R2 doesn't send an LS to R1 on SIB segmentation
* [055] Indicating the TRS/CSI-RS availability in Idle/Inactive when releasing the UE to Idle/Inactive in the *RRCRelease* message is not pursued.
* [055] RAN2 follows RAN1 agreement that if TRS resource is configured in SIB, L1 based availability indication is always enabled based on that configuration.
* [055] RAN2 waits for RAN1 to finalize the contents of SIB-X before finalizing aspects on SIB-X sizing, segmentation etc
* BFD relaxation is enable/disable per serving cell (i.e. separately between Pcell/PScell and Scell). FFS on stage-3 details.
* RLM relaxation is enable/disable per-CG (i.e. separately between Pcell and PScell). FFS on stage-3 details, FFS if enable/disable is by the UE or by the network.
* Parameters of SSearchDeltaP and TSearchDeltaP for low mobility criterion is configured in dedicated signaling. FFS on stage-3 details (i.e. value range of parameters, in which IE).
* RAN2 assumes that the criteria for RLM/BFD relaxation will be captured in RAN2 TS, can ask R4
* RAN2 to send an LS to RAN4 for RLM/BFD relaxation including the below aspects:

RAN2 conclusions on RLM/BFD relaxation

Specification split on RLM/BFD relaxation

* [056] RLM relaxation and BFD relaxation are enabled/disabled separately.
* [056] Postpone the discussion on the granularity for RLM/BFD relaxation enable/disable (e.g. per-UE/CG/Serving cell) to wait for RAN4 conclusions on the configuration of criteria.
* [056] RAN2 assume the criteria configuration for RLM relaxation and BFD relaxation are configured separately. FFS Which criteria configuration(s) could be configured separately (e.g. serving cell quality). RAN2 can come back on this based on RAN4 conclusion.
* [056] Postpone the discussion on how to provide the criteria configuration for RLM relaxation and BFD relaxation for low mobility criterion to wait for progress from RAN4.
* [056] Postpone the discussion on how to provide the criteria configuration for RLM relaxation and BFD relaxation for serving cell quality criterion to wait for progress from RAN4.
* [056] Postpone the discussion on how to evaluate the low mobility criterion for RLM/BFD relaxation to wait for progress from RAN4.
* [056] Postpone the discussion on how to evaluate the serving cell quality criterion for RLM/BFD relaxation to wait for progress from RAN4.
* [056] BWP switch doesn’t impact evaluation of BFD relaxation or ongoing relaxation of BFD measurement.
* [056] if UE report on fulfillment or not (entry/exit) to network for RLM/BFD relaxation is agreeable, UAI is used to provide the report.
* [056] RAN2 assumes the configurations for RLM/BFD relaxation should be captured in RAN2 specification, while the relaxation requirements/approaches should be captured in RAN4 specification.

## **RAN2#116-e agreements**

* Assume that one subgroup indication refer to either CN assigned subgroups or UE-ID based subgroup (no overlapping)
* Both UE ID based and CN based subgrouping can be supported simultaneously in a cell, it is allowed to just support one of them.
* FFS if the total number of CN-assigned subgroups is OAM configured. Max would be 8 as this is what RAN support.
* The total number of CN-assigned subgroups that is used is not fixed can be configured up to 8 (e.g. by OAM). No impact on signalling is assumed.
* RAN introduces a new parameter Nsg-UEID to indicate its support of UE-ID based subgrouping.
* RAN does not support any type of subgrouping if its configuration for subgrouping is either absent or nullified (e.g. *subgroupsNumPerPO* is either absent or set to zero). FFS for the signalling details.
* We assume separate indications for UE capability of CN based subgrouping and UEID based subgrouping.
* UE’s capability of supporting the UE ID based subgrouping is reported to RAN by AS UE capability signalling while R2 assumes that UE’s capability of supporting the CN-assigned subgrouping is reported to CN by NAS signalling.
* We send an LS (short post email discussion)
* RAN2 assumes that if PEI is detected, and the PEI indicates that the UE has to monitor the associated PO, then the UE monitors paging DCI in the associated PO, including scheduling information for paging PDSCH (if included) as in legacy. This assumption may be updated based on RAN1 agreements.
* As a baseline RAN2 has a preference to support PEI with both DRX and eDRX, but potential issues (e.g. PEI and PTW) are FFS.
* For UE-ID based subgroups the UE identity is UE\_ID = 5G-S-TMSI mod X, where X is 8192 (1024\*8).
* Introduce a *UERadioPagingInfo* IE in the *UECapabilityInformation* message in NR in Rel-17.
* If the UE was not able to monitor the PEI occasion corresponding to its PO the UE shall monitor the PO.
* The scope of the new SIB-X is configurable (either cell or area scope) based on NW implementation.
* RAN2 to wait for additional RAN1 feedback, before finalizing aspects on SIB-X sizing, segmentation etc.
* RAN2 to wait for further RAN1 input on whether TRS/CSI-RS configuration can be split as common and TRS specific part.
* The new SIB-X can be made on demand, and it is up to NW configuration.
* There are no UE side impacts due to any additional NW side restriction on on-demand SIB-X.
* IDLE/INACTIVE UEs do NOT have to report any feedback on its TRS/CSI-RS resource usage.
* RAN2 assumes to support current RAN1 working agreement of L1 based signalling for TRS/CSI-RS availability indication. FFS whether it should be possible to enable / disable the TRS/CSI-RS L1 based availability mechanism by broadcast signalling.
* R2 assumes that additional TRS/CSI-RS configuration by dedicated signalling is not supported. Can revisit e.g. based on R1 provided info if needed.
* Postpone further discussion on TRS/CSI-RS applicability for eDRX UEs. Can consider later
* RLM/BFD relaxation criteria are configured by dedicated signalling (e.g. *RadioLinkMonitoringConfig*) as a baseline, if RAN4 decides to provide parameters instead of predefined or by implementation.
* R2 assumes to use AS capability procedure to report UE capability of supporting RLM/BFD relaxation. Details FFS.
* RAN2 wait for RAN4 progress on the designing of low mobility criterion.
* RAN2 assumes the presence/absence of configuration for RLM/BFD relaxation criteria in signalling indicates to the UE whether the UE can/should evaluate the criteria.

## **RAN2#115-e agreements**

* When AMF has assigned a UE with a Paging subgroup, some NAS signaling should be supported between AMF and UE to convey the related information to the UE. Exact information is FFS. The design and procedure are up to SA2/CT1.
* When AMF has assigned a UE with a Paging subgroup, some signaling should be supported between AMF and gNB(s) to inform gNB(s) about the related subgroup information for paging a UE in RRC\_IDLE/RRC\_INACTIVE. Exact information is FFS. The message(s) and associated design are up to RAN3.
* It is FFS when a UE in RRC\_INACTIVE has been assigned by CN a Paging subgroup, whether some signaling should be introduced between gNBs to inform each other about the UE’s subgroup for RAN paging.
* If RAN2 agrees to support UE assistance information to CN in support of Paging subgroup assignment, RAN2 will focus on the paging probability and power profile attributes.
* UEID-based subgroup method requires, in addition to the already available information for legacy UEID-based grouping in PO, the total number of supported UEID-based subgroups by the network.
* At least for UEID-based subgroup method the total number, Nsg, of supported subgroups by the network is decided by RAN and broadcasted in System Information.
* At least for UEID-based subgroup method the total number, Nsg, of supported subgroups is controlled on a cell basis and can be different in different cells.
* Option 2 is excluded
* We go with Option 1
* R2 assumes that All the cells within the registration area supports the same number of CN assigned subgroups, i.e. no remapping of CN assigned group ID to RAN subgroup ID (will revisit only if serious issues are found).
* For the purpose of continued discussions, R2 assumes that UE has separate UE caps for CN assigned and UEID based subgrouping, the actual decision to be taken later.
* RAN capability is known based on broadcast information. FFS with explicit indication or implicitly based configuration.
* The TRS/CSI-RS configuration is provided in a new SIB.
* RAN2 assumes that TRS/CSI-RS configurations are broadcasted. Potential addition of dedicated signalling can be discussed in a later meeting based on company contributions.
* The legacy SI update procedure is used for changing TRS/CSI-RS configurations.
* Postpone the topic about TRS/CSI-RS availability until a later meeting when RAN1 also has progressed.
* On demand SI should be possible for the SIB with TRS/CSI-RS information.
* Postpone the discussion on segmentation of the new SIB until RAN1 has sent the list of the parameters and a potential structure.
* Postpone the discussion on splitting the TRS/CSI-RS information to a common and RS-specific part until RAN1 has sent the list of the parameters and a potential structure.

## **RAN2#114-e agreements**

The following is supported:

* CN is responsible for allocating UEs to UE paging subgroups based on UE characteristics
* Use same UE subgroups when in RRC\_IDLE and RRC\_INACTIVE

## **RAN2#113b-e agreements**

* If we go for network controlled subgrouping, If the network chooses to not provide specific subgrouping information, there will be configuration option where subgrouping can be supported by randomization (by UE-ID).
* We adopt Network controlled subgrouping (based on individual UE characteristics, not specified or limited to paging prob as EUTRA, possibly with additional randomization)