**3GPP TSG-RAN WG2 Meeting #115-e *R2-210xxxx***

 **Online, 16 - 27 Aug 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **36.331** | **CR** | **draftCR** | **rev** | **-** | **Current version:** | **16.5.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | [ Enhancements |
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| ***Source to WG:*** | Qualcomm Incorporated |
| ***Source to TSG:*** | RAN2 |
|  |  |
| ***Work item code:*** | NB\_IOTenh4\_LTE\_eMTC6-Core  |  | ***Date:*** | 2021-09-17 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | Introduce Release 17 enhancements for NB-IoT and eMTC |
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| ***Summary of change:*** | This running CR captures the agreements to support enhancements for NB-IoT/eMTC up to and including RAN2 #115-e meeting.**NB-IoT neighbour cell measurements:*** ~~Study current RLF procedure to understand the time taken to select the cell for access. Start and end points FFS.~~
* ~~Support neighbour cell measurements in RRC\_CONNECTED, at least for intra-frequency.~~
	+ - ~~FFS inter-frequency~~
		- ~~FFS whether measurements are done on the anchor carrier~~
		- ~~FFS how neighbour cell measurement is triggered~~
		- ~~FFS how to perform neighbour cell measurements~~
* ~~Working assumption: Neighbour cell measurement results are not reported to the network in RRC\_CONNECTED.~~
	+ - ~~FFS whether and when other information can be sent~~
* ~~Enhancements to the random-access procedure are not considered.~~
* ~~The solution includes reduction of the time between declaration of RLF and the start of the random-access procedure (points C and D)~~
* ~~FFS whether the solution includes reduction of the time between out-of-sync detection and declaration of RLF (points B and C)~~
* ~~Neighbour cells measurement (detection and measurements) are performed only on the anchor carrier.~~
* The solution is optional
* ~~The criteria to start measurements is based on a combination of serving cell quality threshold (option b) and variance of the serving cell quality (option c)~~
* Configuration of the criteria to start the measurements is supported.
	+ - FFS whether any further information needs to be provided by NW
* FFS whether any assistance information from UE is needed.
* FFS if/how to support ‘early’ RLF.
* The configuration of the criteria for starting the measurements include a serving cell NRSRP threshold. FFS how to address variance (as agreed last meeting)
* It is useful to have a shorter T310 timer for UEs supporting this enhancement, but FFS whether this is best achieved with the existing dedicated signalling or based on a new condition
* ~~Prioritisation of carriers/cells to measure is left to the UE implementation.~~
* FFS: whether to provide a separate criteria for inter-frequency measurements (i.e. needing re-tuning) considering that they will take longer and should start earlier.
* ~~Legacy relaxed monitoring criteria is reused to address the variance part of the criteria to start the measurements.~~
	+ - FFS: Whether it is enabled by the provision of separate SSearchDeltaP and TSearchDeltaP parameters from RRC\_IDLE.
* ~~The conditions where the UE is required to perform measurements are specified. No requirement on when to stop measurements is needed.~~
* The configuration of the criteria for starting the measurements is provided via broadcast signalling.
* ~~Provision of information regarding which cells/carriers to be considered is not supported. It is up to UE implementation to choose and prioritize carrier/cell list for measurement.~~
* ~~Report of the cells measured in RRC\_IDLE to assist measurement configuration is not supported.~~
* ~~Report of information about connected measurements during the RRC Connection re-establishment procedure for network optimisation is not supported.~~
* ~~There is no need to specify which subframes can be used for measurements beyond them not being needed for PDCCH monitoring or data transmission / reception.~~
* Support for connected mode measurement is optional with capability signalling.
* FFS: Whether to support an indication from the UE that it starts/ stops performing measurement

**NB-IoT carrier selection based on the coverage level*** ~~Paging carrier selection Improvements based on CE level is considered~~
* ~~Paging carrier selection Improvements based on DRX cycle may be considered~~
	+ - ~~whether DRX cycle is considered as part of CE level (Rmax) or can be also considered separately~~
* Enhancements for NPRACH Carrier selection carrier may be considered
* ~~Paging carrier selection Improvements solely based on WUS or GWUS is not considered~~
* ~~FFS service based~~
* Select between one of the options:
	+ - Option 1: UE selects a paging carrier based on a rule configured by the network
		- Option 2: NW configures a specific paging carrier
* ~~Working assumption: For both options, when coverage changes, mechanism that requires UE to report the update of coverage is not introduced.~~
* Rel-17 paging carriers and the legacy paging carriers should be exclusive.
* RAN2 assumes S1AP/NGAP update is not needed.
* Carrier selection criteria does not include power boosting or service
* ~~FFS: For option 1, whether DRX can be part of the carrier selection criteria~~
* Rel-17 paging carrier configuration is provided in broadcast signalling.
* Select between the following sub-options:
	+ - Option 1c: Network enables UE to select a Rel-17 paging carrier by providing the coverage information (CEL/Rmax) for the carrier selection to the UE in dedicated signalling
		- Option 2a: NW indicates the carrier to use explicitly via dedicated signalling based on information determined within the NW.
* FFS for both options whether there is a report from the UE to suggest a carrier or provide a metric report
* Working assumption: UE metric for determining carrier suitability and selection is based on measured NRSRP. FFS whether to use a hysteresis/longer averaging/timer
* For option 1, upon cell change, FFS:
	+ - Alt 1: based on previously determined CEL and broadcasted paging carrier configuration in the new cell.
		- Alt 2: UE needs to perform fallback mechanism.
* ~~For option 2, upon cell change, UE needs to perform fallback mechanism.~~
* ~~Whenever the R17 coverage-based carrier criteria is met, UE uses the R17 coverage based carrier, otherwise UE should use the fallback mechanism~~
* ~~For both options, fall back carrier is legacy paging carrier based on UE\_ID~~
* Support coverage or carrier specific DRX configurations, FFS details.
* UE capability for Rel-17 paging carrier selection should be introduced
* ~~UE metric for determining carrier suitability and selection is based on NRSRP.~~
* Use a hysteresis/longer averaging/timer for UE metric based on NRSRP.
* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.

**NB-IoT 16-QAM for unicast in UL and DL*** ~~Working assumption: For the UE supporting 16-QAM, the L2 buffer size is 12000 bytes.~~
* Working assumption: Support of 16-QAM has separate UE capabilities for DL and UL
* Confirm the working assumption: The support of 16-QAM uses separate UE capabilities for DL and UL.
* 16QAM is configured via dedicated signaling separately for UL and DL.
* A NPUSCH 16QAM activation indication is needed in PUR configuration.

**14 HARQ processes in DL for HD-FDD Cat M1 UEs*** 14 HARQ activation is configured by dedicated RRC signalling.
* ~~Working assumption: No change to current L2 buffer size requirement~~
* ~~Confirm the working assumption: No change to current L2 buffer size requirement for HD-FDD Cat M1 UEs supporting 14 HARQ processes in DL.~~

**Max DL TBS of 1736 bits for HD-FDD Cat. M1 UEs*** DL TBS of 1736 bits is configured by dedicated RRC signalling.
* ~~FFS: Whether to update L2 buffer size requirement~~
* ~~The table 4.1A-1 in TS 36.306 for DL Category M1 needs to be updated to indicate 1736 bits TBS and 43008 soft channel bits.~~
* Max DL TBS of 1736 bits can be supported for PUR.
* FFS EDT support.
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| ***Consequences if not approved:*** | Release 17 enhancements for NB-IoT and eMTC will not be supported. |
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| ***Clauses affected:*** | 5.3.3.4 (TBD), 5.3.3.4a (TBD), 5.3.7.5 (TBD), 6.3.2, 6.3.6, 6.7.2 (TBD), 6.7.3.1, 6.7.3.2, 6.7.3.6 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 36.300 CR xxxx, TS 36.304 CR xxxx, TS 36.306 CR xxxx, TS 36.321 CR xxxx  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** | R2-210xxxx – Initial version. |

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| Start of first change |

Editor’s Note: May need changes to actions for transmission of RRCConnectionSetupComplete depending on outcome of following FFS:

* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.

#### 5.3.3.4 Reception of the *RRCConnectionSetup* by the UE

NOTE 1: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

1> except when the UE connected to 5GC is a BL UE or UE in CE, if the *RRCConnectionSetup* is received in response to an *RRCConnectionResumeRequest* from a suspended RRC connection:

2> if the UE is resuming an RRC connection after early security reactivation in accordance with conditions in 5.3.3.18:

3> discard any current AS security context including the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key;

2> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity for all established or suspended RBs, except for SRB0;

2> discard the stored UE AS context and *resumeIdentity*;

2> if stored, discard the stored *nextHopChainingCount*;

2> if stored, discard the stored *drb-ContinueROHC*;

2> indicate to upper layers fallback of the RRC connection;

1> if the *RRCConnectionSetup* is received in response to an *RRCConnectionResumeRequest* from RRC\_INACTIVE:

2> stop T380 if running;

2> discard the stored UE Inactive AS context;

2> release *rrc-InactiveConfig*, if configured;

1> if the UE connected to 5GC is a BL UE or UE in CE, and the *RRCConnectionSetup* is received in response to an *RRCConnectionResumeRequest* from a suspended RRC connection:

2> discard the stored UE AS context and *resumeIdentity*;

2> if stored, discard the stored *nextHopChainingCount*;

2> if stored, discard the stored *drb-ContinueROHC*;

1> if the *RRCConnectionSetup* is received in response to an *RRCConnectionResumeRequest* from RRC\_INACTIVE; or

1> if the UE connected to 5GC is a BL UE or UE in CE, and the *RRCConnectionSetup* is received in response to an *RRCConnectionResumeRequest* from a suspended RRC connection:

2> discard any current AS security context including the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key;

2> release radio resources for all established RBs except SRB0, including release of the RLC entities, of the associated PDCP entities and of SDAP entities;

2> release the RRC configuration except for the default L1 parameter values, default MAC main configuration and CCCH;

2> apply the default NR PDCP configuration as specified in TS 38.331 [82], clause 9.2.1.1 for SRB1;

2> use NR PDCP for all subsequent messages received and sent by the UE via SRB1;

2> indicate to upper layers fallback of the RRC connection;

1> if the *RRCConnectionSetup* is received in response to an *RRCEarlyDataRequest* or *RRCConnectionResumeRequest* for transmission using PUR:

2> instruct the associated MAC entity to start *timeAlignmentTimer*;

1> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;

1> if stored, discard the cell reselection priority information provided by the *idleModeMobilityControlInfo* or inherited from another RAT;

1> if stored, discard the *altFreqPriorities* provided by the *RRCConnectionRelease*;

1> if stored, discard the dedicated offset provided by the *redirectedCarrierOffsetDedicated*;

1> stop timer T300;

1> if T302 is running:

2> stop timer T302;

2> if the UE is connected to 5GC:

3> perform the actions as specified in 5.3.16.4;

1> stop timer T303, if running;

1> stop timer T305, if running;

1> stop timer T306, if running;

1> stop timer T308, if running;

1> perform the actions as specified in 5.3.3.7;

1> stop timer T320, if running;

1> stop timer T350, if running;

1> perform the actions as specified in 5.6.12.4;

1> release *rclwi-Configuration*, if configured, as specified in 5.6.16.2;

1> stop timer T360, if running;

1> stop timer T322, if running;

1> if timer T331 is running:

2> stop timer T331;

2> perform the actions as specified in 5.6.20.3;

1> stop timer T323, if running;

1> forward the *dedicatedInfoNAS,* if received, to the upper layers;

1> if T309 is running:

2> stop timer T309 for all access categories;

2> perform the actions as specified in 5.3.16.4.

1> enter RRC\_CONNECTED;

1> stop the cell re-selection procedure;

1> consider the current cell to be the PCell;

1> except for NB-IoT:

2> if the UE supports RLF report for inter-RAT MRO EUTRA as defined in TS 38.306 [87], and if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 38.331 [82] and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 38.331 [82]:

3> if *reconnectCellId* in *VarRLF-Report* of TS 38.331 [82] is not set, and if the received *RRCConnectionSetup* is in response to an *RRCConnectionRequest*:

4> set *timeUntilReconnection* in *VarRLF-Report* of TS 38.331 [82] to the time that elapsed since the last radio link failure or handover failure;

4> set *eutraReconnectCellId* in *reconnectCellId* in *VarRLF-Report* of TS 38.331 [82] to the global cell identity and the tracking area code of the PCell;

2> if the UE radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:

3> if *reconnectCellId* in *VarRLF-Report* is not set, and if the received *RRCConnectionSetup* is in response to an *RRCConnectionRequest*:

4> set *timeUntilReconnection* in *VarRLF-Report* to the time that elapsed since the last radio link failure or handover failure;

4> set *eutraReconnectCellId* in *reconnectCellId* in *VarRLF-Report* to the global cell identity and the tracking area code of the PCell;

1> set the content of *RRCConnectionSetup**Complete* message as follows:

2> if the *RRCConnectionSetup* is received in response to an *RRCConnectionResumeRequest*:

3> if upper layers provide an S-TMSI:

4> set the *s-TMSI* to the value received from upper layers;

3> else if upper layers provide a 5G-S-TMSI:

4> if the UE is a NB-IoT UE:

5> set the *ng-5G-S-TMSI* to the value received from upper layers;

4> else:

5> set the *ng-5G-S-TMSI-Bits* to *ng-5G-S-TMSI* with the value received from upper layers;

2> else if upper layers provide a 5G-S-TMSI:

3> except for NB-IoT, set the *ng-5G-S-TMSI-Bits* to *ng-5G-S-TMSI-Part2* to the leftmost 8 bits of 5G-S-TMSI received from upper layers;

2> set the *selectedPLMN-Identity* to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35] for E-UTRA/EPC and TS 24.501 [95] for E-UTRA/5GC) from the PLMN(s) included in the *plmn-IdentityList* in *SystemInformationBlockType1* (or *SystemInformationBlockType1-NB* in NB-IoT);

2> if upper layers provide the 'Registered MME', include and set the *registeredMME* as follows:

3> if the PLMN identity of the 'Registered MME' is different from the PLMN selected by the upper layers:

4> include the *plmnIdentity* in the *registeredMME* and set it to the value of the PLMN identity in the 'Registered MME' received from upper layers;

3> set the *mmegi* andthe *mmec* to the value received from upper layers;

2> if upper layers provided the 'Registered MME':

3> include and set the *gummei-Type* to the value provided by the upper layers;

2> if upper layers provide the 'Registered AMF', include and set the *registeredAMF* as follows:

3> if the PLMN identity of the 'Registered AMF' is different from the PLMN selected by the upper layers:

4> include the *plmnIdentity* in the *registeredAMF* and set it to the value of the PLMN identity in the 'Registered AMF' received from upper layers;

3> set the *amf-Identifier* to AMF Identifier of the 'Registered AMF' received from upper layers;

2> if upper layers provided the 'Registered AMF':

3> include and set the *guami-Type* to the value provided by the upper layers;

2> if upper layers provide one or more S-NSSAI (see TS 23.003 [27]):

3> include the *s-NSSAI-list* and set the content to the values provided by the upper layers;

2> if the UE supports CIoT EPS optimisation(s):

3> include a*ttachWithoutPDN-Connectivity* if received from upper layers;

3> include *up-CIoT-EPS-Optimisation* if received from upper layers;

3> except for NB-IoT, include *cp-CIoT-EPS-Optimisation* if received from upper layers;

2> if the UE supports CIoT 5GS optimisation(s):

3> for NB-IoT, include *ng-U-DataTransfer* if received from upper layers;

3> except for NB-IoT, include *cp-CIoT-5GS-Optimisatoin* if received from upper layers;

2> if connecting as an RN:

3> include the *rn-SubframeConfigReq*;

2> if the *RRCConnectionSetup* is received in response to *RRCEarlyDataRequest*:

3> set the *dedicatedInfoNAS* to a zero-length octet string;

2> else:

3> set the *dedicatedInfoNAS* to include the information received from upper layers;

2> if the *RRCConnectionSetup* is not in response to transmission using PUR and the UE has a stored *pur-Config* including *pur-ConfigID*:

3> include the stored *pur-ConfigID*;

2> if the UE is connected to EPC:

3> except for NB-IoT:

4> include the *mobilityState* and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC\_CONNECTED state;

4> if the UE has flight path information available:

5> include *flightPathInfoAvailable*;

3> for NB-IoT:

4> if the UE has radio link failure information available in *VarRLF-Report-NB* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report-NB*:

5> include *rlf-InfoAvailable*;

4> if the UE has ANR measurements information available in *VarANR-MeasReport-NB* and if the RPLMN is included in *plmn-IdentityList* stored in *VarANR-MeasReport-NB*:

5> include *anr-InfoAvailable*;

3> include *dcn-ID* if a DCN-ID value (see TS 23.401 [41]) is received from upper layers;

2> else (i.e. the UE is connected to 5GC):

3> if the UE is a BL UE:

4> include *lte-M*;

2> except for NB-IoT:

3> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:

4> include *rlf-InfoAvailable*;

3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

4> include *logMeasAvailableMBSFN*;

3> if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

4> include *logMeasAvailable*;

4> if Bluetooth measurement results are included in the logged measurements the UE has available:

5> include *logMeasAvailableBT*;

4> if WLAN measurement results are included in the logged measurements the UE has available:

5> include *logMeasAvailableWLAN*;

3> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:

4> include *connEstFailInfoAvailable*;

3> if the UE supports storage of mobility history information and the UE has mobility history information available in *VarMobilityHistoryReport*:

4> include the *mobilityHistoryAvail*;

3> if the SIB2 contains *idleModeMeasurements* and the UE has E-UTRA idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*; or

3> if the SIB2 contains *idleModeMeasurementsNR* and the UE has NR idle/inactive measurement information available in *VarMeasIdleReport*:

4> include the *idleMeasAvailable*;

3> if upper layers indicate that access to RLOS is initiated (see TS 23.401 [41] subclause 4.3.8.3):

4> set *rlos-Request* to *true*;

2> if UE needs UL gaps during continuous uplink transmission:

3> include *ue-CE-NeedULGaps*;

2> for NB-IoT:

3> if the UE supports serving cell idle mode measurements reporting and *servingCellMeasInfo* is present in *SystemInformationBlockType2-NB*:

4> set the *measResultServCell* to include the measurements of the serving cell;

 NOTE 2: The UE includes the latest results of the serving cell measurements as used for cell selection/ reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

2> if connecting as an IAB-node:

3> include *iab-NodeIndication;*

1> submit the *RRCConnectionSetupComplete* message to lower layers for transmission;

1> the procedure ends.

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| Start of next change |

Editor’s Note: May need changes to actions for transmission of RRCConnectionResumeComplete depending on outcome of following FFS:

* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.

#### 5.3.3.4a Reception of the *RRCConnectionResume* by the UE

The UE shall:

1> stop timer T300;

1> if T309 is running:

2> stop timer T309 for all access categories;

2> perform the actions as specified in 5.3.16.4.

1> stop T380 if running;

1> if the *RRCConnectionResume* is received in response to an *RRCConnectionResumeRequest* for EDT or for transmission using PUR:

2> discard the stored UE AS context and *resumeIdentity*;

2> if the *RRCConnectionResume* is received in response to an *RRCConnectionResumeRequest* for transmission using PUR:

3> instruct the associated MAC entity to start *timeAlignmentTimer*;

1> else:

2> if resuming an RRC connection from a suspended RRC connection in EPC; or

2> for NB-IoT, if resuming an RRC connection from a suspended RRC connection in 5GC and *fullConfig* is not present in the *RRCConnectionResume* message:

3> restore the PDCP state and re-establish PDCP entities for SRB2, if configured withE-UTRA PDCP, and for all DRBs that are configured with E-UTRA PDCP;

3> if *drb-ContinueROHC* is included:

4> indicate to lower layers that stored UE AS context is used and that *drb-ContinueROHC* is configured;

4> continue the header compression protocol context for the DRBs configured with the header compression protocol;

3> else:

4> indicate to lower layers that stored UE AS context is used;

4> reset the header compression protocol context for the DRBs configured with the header compression protocol;

3> if *restoreMCG-SCells* is included:

4> restore the MCG SCell(s) configuration, if stored;

3> else:

4> release the MCG SCell(s) from the UE AS context, if stored;

3> if *restoreSCG* is included:

4> restore *nr-SecondaryCellGroupConfig*, if stored;

3> else if the UE was configured with EN-DC:

4> perform MR-DC release, as specified in TS 38.331 [82], clause 5.3.5.10;

4> release *tdm-PatternConfig* or *tdm-PatternConfig2*, if configured;

3> discard the stored UE AS context and *resumeIdentity*;

3> configure lower layers to consider the restored MCG and SCG SCell(s) (if any) to be in deactivated state;

2> else if the *RRCConnectionResume* message includes the *fullConfig* (i.e., for resuming an RRC connection from RRC\_INACTIVE or for resuming a suspended RRC connection in 5GC):

3> perform the radio configuration procedure as specified in 5.3.5.8;

2> else if resuming an RRC connection from RRC\_INACTIVE:

3> restore the following from the stored UE Inactive AS context:

- MCG physical layer configuration,

- MCG MAC configuration,

- MCG RLC configuration,

- PDCP configuration;

3> if *restoreMCG-SCells* is included:

4> restore the MCG SCell(s) configuration, if stored;

3> else:

4> release the MCG SCell(s) from the UE Inactive AS context, if stored;

3> if *restoreSCG* is included:

4> restore *nr-SecondaryCellGroupConfig*, if stored;

3> else if the UE was configured with NGEN-DC:

4> perform MR-DC release, as specified in TS 38.331 [82], clause 5.3.5.10;

4> release *tdm-PatternConfig* or *tdm-PatternConfig2*, if configured;

3> discard the stored UE Inactive AS context;

3> configure lower layers to consider the restored MCG and SCG SCell(s) (if any) to be in deactivated state;

3> release the *rrc-InactiveConfig*, except *ran-NotificationAreaInfo*;

2> else (i.e., except for NB-IoT for resuming a suspended RRC connection in 5GC):

3> restore the physical layer configuration, the MAC configuration, the RLC configuration and the PDCP configuration from the stored UE AS context;

3> discard the stored UE AS context and *resumeIdentity*;

1> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;

NOTE 1: When performing the radio resource configuration procedure, for the physical layer configuration and the MAC Main configuration, the restored RRC configuration from the stored UE AS context is used as basis for the reconfiguration.

1> if the received *RRCConnectionResume* includes the *sCellToReleaseList*:

2> perform SCell release as specified in 5.3.10.3a;

1> if the received *RRCConnectionResume* includes the *sCellToAddModList*:

2> perform SCell addition or modification as specified in 5.3.10.3b;

1> if the received *RRCConnectionResume* includes the *sCellGroupToReleaseList*:

2> perform SCell group release as specified in 5.3.10.3d;

1> if the received *RRCConnectionResume* includes the *sCellGroupToAddModList*:

2> perform SCell group addition or modification as specified in 5.3.10.3e;

1> if the received *RRCConnectionResume* message includes the *nr-SecondaryCellGroupConfig*:

2> perform NR RRC Reconfiguration as specified in TS 38.331 [82], clause 5.3.5.3;

1> if the received *RRCConnectionResume* message includes the *sk-Counter*:

2> perform key update procedure as specified in TS 38.331 [82], clause 5.3.5.8;

1> if the received *RRCConnectionResume* message includes the *nr-RadioBearerConfig1*:

2> perform radio bearer configuration as specified in TS 38.331 [82], clause 5.3.5.6;

1> if the received *RRCConnectionResume* message includes the *nr-RadioBearerConfig2*:

2> perform radio bearer configuration as specified in TS 38.331 [82], clause 5.3.5.6;

1> except if the *RRCConnectionResume* is received in response to an *RRCConnectionResumeRequest* for EDT or for transmission using PUR:

2> resume SRB2, SRB3 (if configured), and all DRBs, if any, including RBs configured with NR PDCP;

1> if stored, discard the cell reselection priority information provided by the *idleModeMobilityControlInfo* or inherited from another RAT;

1> if stored, discard the *altFreqPriorities* provided by the *RRCConnectionRelease*;

1> if stored, discard the dedicated offset provided by the *redirectedCarrierOffsetDedicated*;

1> if the *RRCConnectionResume* message includes the *measConfig*:

2> perform the measurement configuration procedure as specified in 5.5.2;

1> if T302 is running:

2> stop timer T302;

2> if the UE is connected to 5GC:

3> perform the actions as specified in 5.3.16.4;

1> stop timer T303, if running;

1> stop timer T305, if running;

1> stop timer T306, if running;

1> stop timer T308, if running;

1> perform the actions as specified in 5.3.3.7;

1> stop timer T320, if running;

1> stop timer T350, if running;

1> perform the actions as specified in 5.6.12.4;

1> stop timer T360, if running;

1> stop timer T322, if running;

1> stop timer T323, if running;

1> if timer T331 is running:

2> stop timer T331;

2> perform the actions as specified in 5.6.20.3;

1> if the UE is resuming an RRC connection after early security reactivation in accordance with conditions in 5.3.3.18 or *RRCConnectionResume* is received in response to an *RRCConnectionResumeRequest* from RRC\_INACTIVE:

2> ignore the *nextHopChainingCount* value indicated in the *RRCConnectionResume* message;

1> else:

2> if resuming an RRC connection from a suspended RRC connection in EPC:

3> update the KeNB key based on the KASME key to which the current KeNB is associated, using the *nextHopChainingCount* value indicated in the *RRCConnectionResume* message, as specified in TS 33.401 [32];

3> store the *nextHopChainingCount* value;

3> derive the KRRCint key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

3> request lower layers to verify the integrity protection of the *RRCConnectionResume* message, using the previously configured algorithm and the KRRCint key;

3> if the integrity protection check of the *RRCConnectionResume* message fails:

4> perform the actions upon leaving RRC\_CONNECTED as specified in 5.3.12, with release cause 'other', upon which the procedure ends;

3> derive the KRRCenc key and the KUPenc key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];

3> configure lower layers to resume integrity protection using the previously configured algorithm and the KRRCint key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE;

3> configure lower layers to resume ciphering and to apply the ciphering algorithm, the KRRCenc key and the KUPenc key, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE;

1> enter RRC\_CONNECTED;

1> indicate to upper layers that the suspended RRC connection has been resumed;

1> stop the cell re-selection procedure;

1> consider the current cell to be the PCell;

1> set the content of *RRCConnectionResumeComplete* message as follows:

2> set the *selectedPLMN-Identity* to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35] for E-UTRA/EPC and TS 24.501 [95] for E-UTRA/5GC) from the PLMN(s) included in the *plmn-IdentityList* in *SystemInformationBlockType1*;

2> set the *dedicatedInfoNAS* to include the information received from upper layers;

2> except for NB-IoT:

3> if resuming an RRC connection from a suspended RRC connection:

4> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:

5> include *rlf-InfoAvailable*;

4> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

5> include *logMeasAvailableMBSFN*;

4> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

5> include *logMeasAvailable*;

5> if Bluetooth measurement results are included in the logged measurements the UE has available:

6> include *logMeasAvailableBT*;

5> if WLAN measurement results are included in the logged measurements the UE has available:

6> include *logMeasAvailableWLAN*;

4> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:

5> include *connEstFailInfoAvailable*;

4> include the *mobilityState* and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC\_CONNECTED state;

4> if the UE has flight path information available:

5> include *flightPathInfoAvailable*;

3> if the UE supports storage of mobility history information and the UE has mobility history information available in *VarMobilityHistoryReport*:

4> include *mobilityHistoryAvail*;

3> if the *idleModeMeasurementReq* is included in the *RRCConnectionResume* message:

4> if the UE has idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*:

5> set the *measResultListIdle-r16* in the *RRCConnectionResumeComplete* message to the value of *measReportIdle-r15* in the *VarMeasIdleReport*;

5> set the *measResultListExtIdle* in the *RRCConnectionResumeComplete* message to the value of *measReportIdle-r16* in the *VarMeasIdleReport*, if available;

5> set the *measResultListIdleNR* in the *RRCConnectionResumeComplete* message to the value of *measReportIdleNR* in the *VarMeasIdleReport*, if available;

5> discard the *VarMeasIdleReport* upon successful delivery of the *RRCConnectionResumeComplete* message is confirmed by lower layers;

3> else:

4> if the SIB2 contains *idleModeMeasurements* and the UE has E-UTRA idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*; or

4> if the SIB2 contains *idleModeMeasurementsNR* and the UE has NR idle/inactive measurement information available in *VarMeasIdleReport*:

5> include the *idleMeasAvailable*;

3> if the *RRCConnectionResume* message includes *nr-SecondaryCellGroupConfig*:

4> include *scg-ConfigResponseNR* in accordance with TS 38.331 [82], clause 5.3.5.3;

2> for NB-IoT:

3> if the UE supports serving cell idle mode measurements reporting and *servingCellMeasInfo* is present in *SystemInformationBlockType2-NB*:

4> set the *measResultServCell* to include the measurements of the serving cell;

 NOTE 2: The UE includes the latest results of the serving cell measurements as used for cell selection/ reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

3> if the UE is connected to EPC:

4> if the UE has radio link failure information available in *VarRLF-Report-NB* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report-NB*:

5> include *rlf-InfoAvailable*;

4> if the UE has ANR measurements information available in *VarANR-MeasReport-NB* and if the RPLMN is included in *plmn-IdentityList* stored in *VarANR-MeasReport-NB*:

5> include *anr-InfoAvailable*;

1> if the UE is configured to operate in EN-DC as result of this procedure, forward *upperLayerIndication* to upper layers as if the UE has received this field from SIB2, otherwise indicate to upper layers the absence of this field;

1> submit the *RRCConnectionResumeComplete* message to lower layers for transmission;

1> the procedure ends.

|  |
| --- |
| Start of next change |

Editor’s Note: May need changes to actions for transmission of RRCConnectionReestablishmentComplete depending on outcome of following FFS:

* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.

#### 5.3.7.5 Reception of the *RRCConnectionReestablishment* by the UE

NOTE 1: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

1> stop timer T301;

1> consider the current cell to be the PCell;

1> except for a NB-IoT UE for which AS security has not been activated:

2> if SRB1 was configured with NR PDCP and the UE is connected to EPC:

3> for SRB1, release the NR PDCP entity and establish an E-UTRA PDCP entity with the current (MCG) security configuration;

NOTE 1a: The UE applies the LTE ciphering and integrity protection algorithms that are equivalent to the previously configured NR security algorithms.

2> else:

3> for SRB1, re-establish the PDCP entity;

2> re-establish RLC for SRB1;

2> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;

2> resume SRB1;

NOTE 2: E-UTRAN should not transmit any message on SRB1 prior to receiving the *RRCConnectionReestablishmentComplete* message.

2> if UE is connected to EPC, update the KeNB key based on the KASME key to which the current KeNB is associated, using the *nextHopChainingCount* value indicated in the *RRCConnectionReestablishment* message, as specified in TS 33.401 [32];

2> else if UE is connected to 5GC, update the KeNB key based on the KAMF key to which the current KeNB is associated, using the *nextHopChainingCount* value indicated in the *RRCConnectionReestablishment* message, as specified in TS 33.501 [86];

2> store the *nextHopChainingCount* value;

2> derive the KRRCint key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

2> derive the KRRCenc key and the KUPenc key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];

2> if connected as an RN:

3> derive the KUPint key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

2> configure lower layers to activate integrity protection using the previously configured algorithm and the KRRCint key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

2> if connected as an RN:

3> configure lower layers to apply integrity protection using the previously configured algorithm and the KUPint key, for subsequently resumed or subsequently established DRBs that are configured to apply integrity protection, if any;

2> configure lower layers to apply ciphering using the previously configured algorithm, the KRRCenc key and the KUPenc key immediately, i.e., ciphering shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

2> if the UE is not a NB-IoT UE:

3> set the content of *RRCConnectionReestablishmentComplete* message as follows:

4> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:

5> include the *rlf-InfoAvailable*;

4> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport* and if T330 is not running:

5> include *logMeasAvailableMBSFN*;

4> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

5> include the *logMeasAvailable*;

5> if Bluetooth measurement results are included in the logged measurements the UE has available:

6> include the *logMeasAvailableBT*;

5> if WLAN measurement results are included in the logged measurements the UE has available:

6> include the *logMeasAvailableWLAN*;

4> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:

5> include the *connEstFailInfoAvailable*;

4> if the UE has flight path information available and if the UE is connected to EPC:

5> include *flightPathInfoAvailable*;

3> perform the measurement related actions as specified in 5.5.6.1;

3> perform the measurement identity autonomous removal as specified in 5.5.2.2a;

2> else:

3> if the UE supports serving cell idle mode measurements reporting and *servingCellMeasInfo* is present in *SystemInformationBlockType2-NB*:

4> set the *measResultServCell* to include the measurements of the serving cell;

 NOTE 2a: The UE includes the latest results of the serving cell measurements as used for cell selection/ reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

3> if the UE is connected to EPC:

4> if the UE has radio link failure information available in *VarRLF-Report-NB* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report-NB*:

5> include the *rlf-InfoAvailable*;

4> if the UE has ANR measurements information available in *VarANR-MeasurementReport-NB* and if the RPLMN is included in *plmn-IdentityList* stored in *VarANR-MeasurementReport-NB*:

5> include the *anr-InfoAvailable*;

2> submit the *RRCConnectionReestablishmentComplete* message to lower layers for transmission;

2> if *SystemInformationBlockType15* is broadcast by the PCell:

3> if the UE has transmitted an *MBMSInterestIndication* message during the last 1 second preceding detection of radio link failure:

4> ensure having a valid version of *SystemInformationBlockType15* for the PCell;

4> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;

4> determine the set of MBMS services of interest in accordance with 5.8.5.3a;

4> initiate transmission of the *MBMSInterestIndication* message in accordance with 5.8.5.4;

2> if *SystemInformationBlockType18* is broadcast by the PCell; and the UE transmitted a *SidelinkUEInformation* message indicating a change of sidelink communication related parameters relevant in PCell (i.e. change of *commRxInterestedFreq* or *commTxResourceReq*, *commTxResourceReqUC* if *SystemInformationBlockType18* includes *commTxResourceUC-ReqAllowed* or *commTxResourceInfoReqRelay* if PCell broadcasts *SystemInformationBlockType19* including *discConfigRelay*) during the last 1 second preceding detection of radio link failure; or

2> if *SystemInformationBlockType19* is broadcast by the PCell; and the UE transmitted a *SidelinkUEInformation* message indicating a change of sidelink discovery related parameters relevant in PCell (i.e. change of *discRxInterest* or *discTxResourceReq*, *discTxResourceReqPS* if *SystemInformationBlockType19* includes *discConfigPS* or *discRxGapReq* or *discTxGapReq* if the UE is configured with *gapRequestsAllowedDedicated* set to *true* or if the UE is not configured with *gapRequestsAllowedDedicated* and *SystemInformationBlockType19* includes *gapRequestsAllowedCommon*) during the last 1 second preceding detection of radio link failure; or

2> if *SystemInformationBlockType21* including *sl-V2X-ConfigCommon* is broadcast by the PCell; and the UE transmitted a *SidelinkUEInformation* message indicating a change of V2X sidelink communication related parameters relevant in PCell (i.e. change of *v2x-CommRxInterestedFreqList* or *v2x-CommTxResourceReq*) during the last 1 second preceding detection of radio link failure:

3> initiate transmission of the *SidelinkUEInformation* message in accordance with 5.10.2.3;

1> for a NB-IoT UE for which AS security has not been activated:

2> validate *dl-NAS-MAC*, as specified in TS 33.401 [32];

2> if *dl-NAS-MAC* check fails:

3> perform the actions upon leaving RRC\_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure', upon which the procedure ends;

2> except for a UE that only supports the Control Plane CIoT EPS/5GS optimisation:

3> re-establish PDCP for SRB1;

3> re-establish RLC for SRB1;

2> re-establish RLC for SRB1bis;

2> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;

2> except for a UE that only supports the Control Plane CIoT EPS/5GS optimisation:

3> resume SRB1;

2> resume SRB1bis;

NOTE 3: E-UTRAN should not transmit any message on SRB1bis prior to receiving the *RRCConnectionReestablishmentComplete* message.

2> if the UE supports serving cell idle mode measurements reporting and *servingCellMeasInfo* is present in *SystemInformationBlockType2-NB*:

3> set the *measResultServCell* to include the measurements of the serving cell;

 NOTE 4: The UE includes the latest results of the serving cell measurements as used for cell selection/ reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

2> submit the *RRCConnectionReestablishmentComplete* message to lower layers for transmission;

1> the procedure ends;

|  |
| --- |
| Start of next change |

### 6.3.2 Radio resource control information elements

<Unchanged text omitted >

Editor’s Note: PhysicalConfigDedicated updates needed to implement following agreement:

* HARQ activation is configured by dedicated RRC signalling.
* DL TBS of 1736 bits is configured by dedicated RRC signalling.

Editor’s Note: Used information from RAN1 parameters document R1-2108684 to derive the field names and the corresponding descriptions.

#### – *PhysicalConfigDedicated*

The IE *PhysicalConfigDedicated* is used to specify the UE specific physical channel configuration.

*PhysicalConfigDedicated* information element

-- ASN1START

PhysicalConfigDedicated ::= SEQUENCE {

 pdsch-ConfigDedicated PDSCH-ConfigDedicated OPTIONAL, -- Need ON

 pucch-ConfigDedicated PUCCH-ConfigDedicated OPTIONAL, -- Need ON

 pusch-ConfigDedicated PUSCH-ConfigDedicated OPTIONAL, -- Need ON

 uplinkPowerControlDedicated UplinkPowerControlDedicated OPTIONAL, -- Need ON

 tpc-PDCCH-ConfigPUCCH TPC-PDCCH-Config OPTIONAL, -- Need ON

 tpc-PDCCH-ConfigPUSCH TPC-PDCCH-Config OPTIONAL, -- Need ON

 cqi-ReportConfig CQI-ReportConfig OPTIONAL, -- Cond CQI-r8

 soundingRS-UL-ConfigDedicated SoundingRS-UL-ConfigDedicated OPTIONAL, -- Need ON

 antennaInfo CHOICE {

 explicitValue AntennaInfoDedicated,

 defaultValue NULL

 } OPTIONAL, -- Cond AI-r8

 schedulingRequestConfig SchedulingRequestConfig OPTIONAL, -- Need ON

 ...,

 [[ cqi-ReportConfig-v920 CQI-ReportConfig-v920 OPTIONAL, -- Cond CQI-r8

 antennaInfo-v920 AntennaInfoDedicated-v920 OPTIONAL -- Cond AI-r8

 ]],

 [[ antennaInfo-r10 CHOICE {

 explicitValue-r10 AntennaInfoDedicated-r10,

 defaultValue NULL

 } OPTIONAL, -- Cond AI-r10

 antennaInfoUL-r10 AntennaInfoUL-r10 OPTIONAL, -- Need ON

 cif-Presence-r10 BOOLEAN OPTIONAL, -- Need ON

 cqi-ReportConfig-r10 CQI-ReportConfig-r10 OPTIONAL, -- Cond CQI-r10

 csi-RS-Config-r10 CSI-RS-Config-r10 OPTIONAL, -- Need ON

 pucch-ConfigDedicated-v1020 PUCCH-ConfigDedicated-v1020 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1020 PUSCH-ConfigDedicated-v1020 OPTIONAL, -- Need ON

 schedulingRequestConfig-v1020 SchedulingRequestConfig-v1020 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicated-v1020

 SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedAperiodic-r10

 SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL, -- Need ON

 uplinkPowerControlDedicated-v1020

 UplinkPowerControlDedicated-v1020 OPTIONAL -- Need ON

 ]],

 [[ additionalSpectrumEmissionCA-r10 CHOICE {

 release NULL,

 setup SEQUENCE {

 additionalSpectrumEmissionPCell-r10 AdditionalSpectrumEmission

 }

 } OPTIONAL -- Need ON

 ]],

 [[ -- DL configuration as well as configuration applicable for DL and UL

 csi-RS-ConfigNZPToReleaseList-r11

 CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToAddModList-r11

 CSI-RS-ConfigNZPToAddModList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigZPToReleaseList-r11

 CSI-RS-ConfigZPToReleaseList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigZPToAddModList-r11 CSI-RS-ConfigZPToAddModList-r11 OPTIONAL, -- Need ON

 epdcch-Config-r11 EPDCCH-Config-r11 OPTIONAL, -- Need ON

 pdsch-ConfigDedicated-v1130 PDSCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON

 -- UL configuration

 cqi-ReportConfig-v1130 CQI-ReportConfig-v1130 OPTIONAL, -- Need ON

 pucch-ConfigDedicated-v1130 PUCCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1130 PUSCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON

 uplinkPowerControlDedicated-v1130

 UplinkPowerControlDedicated-v1130 OPTIONAL -- Need ON

 ]],

 [[ antennaInfo-v1250 AntennaInfoDedicated-v1250 OPTIONAL, -- Cond AI-r10

 eimta-MainConfig-r12 EIMTA-MainConfig-r12 OPTIONAL, -- Need ON

 eimta-MainConfigPCell-r12 EIMTA-MainConfigServCell-r12 OPTIONAL, -- Need ON

 pucch-ConfigDedicated-v1250 PUCCH-ConfigDedicated-v1250 OPTIONAL, -- Need ON

 cqi-ReportConfigPCell-v1250 CQI-ReportConfig-v1250 OPTIONAL, -- Need ON

 uplinkPowerControlDedicated-v1250

 UplinkPowerControlDedicated-v1250 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1250 PUSCH-ConfigDedicated-v1250 OPTIONAL, -- Need ON

 csi-RS-Config-v1250 CSI-RS-Config-v1250 OPTIONAL -- Need ON

 ]],

 [[ pdsch-ConfigDedicated-v1280 PDSCH-ConfigDedicated-v1280 OPTIONAL -- Need ON

 ]],

 [[ pdsch-ConfigDedicated-v1310 PDSCH-ConfigDedicated-v1310 OPTIONAL, -- Need ON

 pucch-ConfigDedicated-r13 PUCCH-ConfigDedicated-r13 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-r13 PUSCH-ConfigDedicated-r13 OPTIONAL, -- Need ON

 pdcch-CandidateReductions-r13

 PDCCH-CandidateReductions-r13 OPTIONAL, -- Need ON

 cqi-ReportConfig-v1310 CQI-ReportConfig-v1310 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicated-v1310

 SoundingRS-UL-ConfigDedicated-v1310 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedUpPTsExt-r13

 SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedAperiodic-v1310

 SoundingRS-UL-ConfigDedicatedAperiodic-v1310 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13

 SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL, -- Need ON

 csi-RS-Config-v1310 CSI-RS-Config-v1310 OPTIONAL, -- Need ON

 ce-Mode-r13 CHOICE {

 release NULL,

 setup ENUMERATED {ce-ModeA,ce-ModeB}

 } OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToAddModListExt-r13 CSI-RS-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToReleaseListExt-r13 CSI-RS-ConfigNZPToReleaseListExt-r13 OPTIONAL -- Need ON

 ]],

 [[ cqi-ReportConfig-v1320 CQI-ReportConfig-v1320 OPTIONAL -- Need ON

 ]],

 [[ typeA-SRS-TPC-PDCCH-Group-r14 CHOICE {

 release NULL,

 setup SEQUENCE (SIZE (1..32)) OF SRS-TPC-PDCCH-Config-r14

 } OPTIONAL, -- Need ON

 must-Config-r14 CHOICE{

 release NULL,

 setup SEQUENCE {

 k-max-r14 ENUMERATED {l1, l3},

 p-a-must-r14 ENUMERATED {

 dB-6, dB-4dot77, dB-3, dB-1dot77,

 dB0, dB1, dB2, dB3} OPTIONAL -- Need ON

 }

 } OPTIONAL, -- Need ON

 pusch-EnhancementsConfig-r14 PUSCH-EnhancementsConfig-r14 OPTIONAL, -- Need ON

 ce-pdsch-pusch-EnhancementConfig-r14 ENUMERATED {on} OPTIONAL, -- Need OR

 antennaInfo-v1430 AntennaInfoDedicated-v1430 OPTIONAL, -- Need ON

 pucch-ConfigDedicated-v1430 PUCCH-ConfigDedicated-v1430 OPTIONAL, -- Need ON

 pdsch-ConfigDedicated-v1430 PDSCH-ConfigDedicated-v1430 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1430 PUSCH-ConfigDedicated-v1430 OPTIONAL, -- Need ON

 soundingRS-UL-PeriodicConfigDedicatedList-r14 SEQUENCE (SIZE (1..2)) OF SoundingRS-UL-ConfigDedicated OPTIONAL, -- Cond PeriodicSRSPCell

 soundingRS-UL-PeriodicConfigDedicatedUpPTsExtList-r14 SEQUENCE (SIZE (1..4)) OF SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL, -- Cond PeriodicSRSExt

 soundingRS-UL-AperiodicConfigDedicatedList-r14 SEQUENCE (SIZE (1..2)) OF SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL, -- Cond AperiodicSRS

 soundingRS-UL-ConfigDedicatedApUpPTsExtList-r14 SEQUENCE (SIZE (1..4)) OF SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL, -- Cond AperiodicSRSExt

 csi-RS-Config-v1430 CSI-RS-Config-v1430 OPTIONAL, -- Need ON

 csi-RS-ConfigZP-ApList-r14 CSI-RS-ConfigZP-ApList-r14 OPTIONAL, -- Need ON

 cqi-ReportConfig-v1430 CQI-ReportConfig-v1430 OPTIONAL, -- Need ON

 semiOpenLoop-r14 BOOLEAN OPTIONAL -- Need ON

 ]],

 [[ csi-RS-Config-v1480 CSI-RS-Config-v1480 OPTIONAL -- Need ON

 ]],

 [[ physicalConfigDedicatedSTTI-r15 PhysicalConfigDedicatedSTTI-r15 OPTIONAL,-- Need ON

 pdsch-ConfigDedicated-v1530 PDSCH-ConfigDedicated-v1530 OPTIONAL,-- Need ON

 pusch-ConfigDedicated-v1530 PUSCH-ConfigDedicated-v1530 OPTIONAL,-- Need ON

 cqi-ReportConfig-v1530 CQI-ReportConfig-v1530 OPTIONAL,-- Need ON

 antennaInfo-v1530 AntennaInfoDedicated-v1530 OPTIONAL,-- Need ON

 csi-RS-Config-v1530 CSI-RS-Config-v1530 OPTIONAL,-- Need ON

 uplinkPowerControlDedicated-v1530

 UplinkPowerControlDedicated-v1530 OPTIONAL, -- Need ON

 semiStaticCFI-Config-r15 CHOICE{

 release NULL,

 setup CHOICE{

 cfi-Config-r15 CFI-Config-r15,

 cfi-PatternConfig-r15 CFI-PatternConfig-r15

 }

 } OPTIONAL, -- Need ON

 blindPDSCH-Repetition-Config-r15 CHOICE{

 release NULL,

 setup SEQUENCE {

 blindSubframePDSCH-Repetitions-r15 BOOLEAN,

 blindSlotSubslotPDSCH-Repetitions-r15 BOOLEAN,

 maxNumber-SubframePDSCH-Repetitions-r15 ENUMERATED {n4,n6} OPTIONAL, -- Need ON

 maxNumber-SlotSubslotPDSCH-Repetitions-r15 ENUMERATED {n4,n6} OPTIONAL, -- Need ON

 rv-SubframePDSCH-Repetitions-r15 ENUMERATED {dlrvseq1, dlrvseq2} OPTIONAL, -- Need ON

 rv-SlotsublotPDSCH-Repetitions-r15 ENUMERATED {dlrvseq1, dlrvseq2} OPTIONAL, -- Need ON

 numberOfProcesses-SubframePDSCH-Repetitions-r15 INTEGER(1..16) OPTIONAL, -- Need ON

 numberOfProcesses-SlotSubslotPDSCH-Repetitions-r15 INTEGER(1..16) OPTIONAL, -- Need ON

 mcs-restrictionSubframePDSCH-Repetitions-r15 ENUMERATED {n0, n1} OPTIONAL, -- Need ON

 mcs-restrictionSlotSubslotPDSCH-Repetitions-r15 ENUMERATED {n0, n1} OPTIONAL -- Need ON

 }

 } OPTIONAL -- Need ON

 ]],

 [[ spucch-Config-v1550 SPUCCH-Config-v1550 OPTIONAL -- Need ON

 ]],

 [[ pdsch-ConfigDedicated-v1610 PDSCH-ConfigDedicated-v1610 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1610 PUSCH-ConfigDedicated-v1610 OPTIONAL, -- Need ON

 ce-CSI-RS-Feedback-r16 ENUMERATED {enabled} OPTIONAL, -- Need OR

 resourceReservationConfigDedicatedDL-r16 SetupRelease {ResourceReservationConfigDedicatedDL-r16} OPTIONAL, -- Need ON

 resourceReservationConfigDedicatedUL-r16 SetupRelease {ResourceReservationConfigDedicatedUL-r16} OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedAdd-r16 SetupRelease {SoundingRS-UL-ConfigDedicatedAdd-r16}

 OPTIONAL, -- Need ON

 uplinkPowerControlAddSRS-r16 SetupRelease {UplinkPowerControlAddSRS-r16} OPTIONAL, -- Need ON

 soundingRS-VirtualCellID-r16 SetupRelease {SoundingRS-VirtualCellID-r16} OPTIONAL, -- Need ON

 widebandPRG-r16 SetupRelease {WidebandPRG-r16} OPTIONAL -- Need ON

 ]],

 [[ ce-14HARQ-r17 ENUMERATED {enabled} OPTIONAL, -- Need OR

 ce-HARQ-ACK-Delay-r17 TYPE FFS OPTIONAL, -- Cond CE14HARQ

 ce-DL-maxTBS-r17 ENUMERATED {enabled} OPTIONAL -- Need OR

 ]]

}

PhysicalConfigDedicated-v1370 ::= SEQUENCE {

 pucch-ConfigDedicated-v1370 PUCCH-ConfigDedicated-v1370 OPTIONAL -- Cond PUCCH-Format4or5

}

PhysicalConfigDedicated-v13c0 ::= SEQUENCE {

 pucch-ConfigDedicated-v13c0 PUCCH-ConfigDedicated-v13c0

}

PhysicalConfigDedicatedSCell-r10 ::= SEQUENCE {

 -- DL configuration as well as configuration applicable for DL and UL

 nonUL-Configuration-r10 SEQUENCE {

 antennaInfo-r10

 AntennaInfoDedicated-r10 OPTIONAL, -- Need ON

 crossCarrierSchedulingConfig-r10

 CrossCarrierSchedulingConfig-r10 OPTIONAL, -- Need ON

 csi-RS-Config-r10 CSI-RS-Config-r10 OPTIONAL, -- Need ON

 pdsch-ConfigDedicated-r10 PDSCH-ConfigDedicated OPTIONAL -- Need ON

 } OPTIONAL, -- Cond SCellAdd

 -- UL configuration

 ul-Configuration-r10 SEQUENCE {

 antennaInfoUL-r10 AntennaInfoUL-r10 OPTIONAL, -- Need ON

 pusch-ConfigDedicatedSCell-r10

 PUSCH-ConfigDedicatedSCell-r10 OPTIONAL, -- Cond PUSCH-SCell1

 uplinkPowerControlDedicatedSCell-r10

 UplinkPowerControlDedicatedSCell-r10 OPTIONAL, -- Need ON

 cqi-ReportConfigSCell-r10 CQI-ReportConfigSCell-r10 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicated-r10

 SoundingRS-UL-ConfigDedicated OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicated-v1020

 SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedAperiodic-r10

 SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL -- Need ON

 } OPTIONAL, -- Cond CommonUL

 ...,

 [[ -- DL configuration as well as configuration applicable for DL and UL

 csi-RS-ConfigNZPToReleaseList-r11

 CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToAddModList-r11

 CSI-RS-ConfigNZPToAddModList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigZPToReleaseList-r11

 CSI-RS-ConfigZPToReleaseList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigZPToAddModList-r11

 CSI-RS-ConfigZPToAddModList-r11 OPTIONAL, -- Need ON

 epdcch-Config-r11 EPDCCH-Config-r11 OPTIONAL, -- Need ON

 pdsch-ConfigDedicated-v1130 PDSCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON

 -- UL configuration

 cqi-ReportConfig-v1130 CQI-ReportConfig-v1130 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1130

 PUSCH-ConfigDedicated-v1130 OPTIONAL, -- Cond PUSCH-SCell1

 uplinkPowerControlDedicatedSCell-v1130

 UplinkPowerControlDedicated-v1130 OPTIONAL -- Need ON

 ]],

 [[ antennaInfo-v1250 AntennaInfoDedicated-v1250 OPTIONAL, -- Need ON

 eimta-MainConfigSCell-r12

 EIMTA-MainConfigServCell-r12 OPTIONAL, -- Need ON

 cqi-ReportConfigSCell-v1250 CQI-ReportConfig-v1250 OPTIONAL, -- Need ON

 uplinkPowerControlDedicatedSCell-v1250

 UplinkPowerControlDedicated-v1250 OPTIONAL, -- Need ON

 csi-RS-Config-v1250 CSI-RS-Config-v1250 OPTIONAL -- Need ON

 ]],

 [[ pdsch-ConfigDedicated-v1280 PDSCH-ConfigDedicated-v1280 OPTIONAL -- Need ON

 ]],

 [[ pucch-Cell-r13 ENUMERATED {true} OPTIONAL, -- Cond PUCCH-SCell1

 pucch-SCell CHOICE{

 release NULL,

 setup SEQUENCE {

 pucch-ConfigDedicated-r13

 PUCCH-ConfigDedicated-r13 OPTIONAL, -- Need ON

 schedulingRequestConfig-r13

 SchedulingRequestConfigSCell-r13 OPTIONAL, -- Need ON

 tpc-PDCCH-ConfigPUCCH-SCell-r13

 TPC-PDCCH-ConfigSCell-r13 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-r13

 PUSCH-ConfigDedicated-r13 OPTIONAL, -- Cond PUSCH-SCell

 uplinkPowerControlDedicated-r13

 UplinkPowerControlDedicatedSCell-v1310 OPTIONAL -- Need ON

 }

 } OPTIONAL, -- Need ON

 crossCarrierSchedulingConfig-r13

 CrossCarrierSchedulingConfig-r13 OPTIONAL, -- Cond Cross-Carrier-Config

 pdcch-ConfigSCell-r13 PDCCH-ConfigSCell-r13 OPTIONAL, -- Need ON

 cqi-ReportConfig-v1310 CQI-ReportConfig-v1310 OPTIONAL, -- Need ON

 pdsch-ConfigDedicated-v1310 PDSCH-ConfigDedicated-v1310 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicated-v1310

 SoundingRS-UL-ConfigDedicated-v1310 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedUpPTsExt-r13

 SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedAperiodic-v1310

 SoundingRS-UL-ConfigDedicatedAperiodic-v1310 OPTIONAL, -- Need ON

 soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13

 SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL, -- Need ON

 csi-RS-Config-v1310 CSI-RS-Config-v1310 OPTIONAL, -- Need ON

 laa-SCellConfiguration-r13 LAA-SCellConfiguration-r13 OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToAddModListExt-r13 CSI-RS-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToReleaseListExt-r13 CSI-RS-ConfigNZPToReleaseListExt-r13 OPTIONAL -- Need ON

 ]],

 [[ cqi-ReportConfig-v1320 CQI-ReportConfig-v1320 OPTIONAL -- Need ON

 ]],

 [[ laa-SCellConfiguration-v1430 LAA-SCellConfiguration-v1430

 OPTIONAL, -- Need ON

 typeB-SRS-TPC-PDCCH-Config-r14 SRS-TPC-PDCCH-Config-r14 OPTIONAL, -- Need ON

 uplinkPUSCH-LessPowerControlDedicated-v1430 UplinkPUSCH-LessPowerControlDedicated-v1430 OPTIONAL, -- Need ON

 soundingRS-UL-PeriodicConfigDedicatedList-r14 SEQUENCE (SIZE (1..2)) OF SoundingRS-UL-ConfigDedicated OPTIONAL, -- Cond PeriodicSRS

 soundingRS-UL-PeriodicConfigDedicatedUpPTsExtList-r14 SEQUENCE (SIZE (1..4)) OF SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL, -- Cond PeriodicSRSExt

 soundingRS-UL-AperiodicConfigDedicatedList-r14 SEQUENCE (SIZE (1..2)) OF SoundingRS-AperiodicSet-r14 OPTIONAL, -- Cond AperiodicSRS

 soundingRS-UL-ConfigDedicatedApUpPTsExtList-r14 SEQUENCE (SIZE (1..4)) OF SoundingRS-AperiodicSetUpPTsExt-r14 OPTIONAL, -- Cond AperiodicSRSExt

 must-Config-r14 CHOICE{

 release NULL,

 setup SEQUENCE {

 k-max-r14 ENUMERATED {l1, l3},

 p-a-must-r14 ENUMERATED {

 dB-6, dB-4dot77, dB-3, dB-1dot77,

 dB0, dB1, dB2, dB3} OPTIONAL -- Need ON

 }

 } OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1430 PUSCH-ConfigDedicatedSCell-v1430 OPTIONAL, -- Need ON

 csi-RS-Config-v1430 CSI-RS-Config-v1430 OPTIONAL, -- Need ON

 csi-RS-ConfigZP-ApList-r14 CSI-RS-ConfigZP-ApList-r14 OPTIONAL, -- Need ON

 cqi-ReportConfig-v1430 CQI-ReportConfig-v1430 OPTIONAL, -- Need ON

 semiOpenLoop-r14 BOOLEAN OPTIONAL, -- Need ON

 pdsch-ConfigDedicatedSCell-v1430 PDSCH-ConfigDedicatedSCell-v1430 OPTIONAL -- Need ON

 ]],

 [[ csi-RS-Config-v1480 CSI-RS-Config-v1480 OPTIONAL -- Need ON

 ]],

 [[ physicalConfigDedicatedSTTI-r15 PhysicalConfigDedicatedSTTI-r15 OPTIONAL, -- Need ON

 pdsch-ConfigDedicated-v1530 PDSCH-ConfigDedicated-v1530 OPTIONAL, -- Need ON

 dummy CQI-ReportConfig-v1530 OPTIONAL, -- Need ON

 cqi-ReportConfigSCell-r15 CQI-ReportConfigSCell-r15 OPTIONAL, -- Need ON

 cqi-ShortConfigSCell-r15 CQI-ShortConfigSCell-r15 OPTIONAL, -- Need ON

 csi-RS-Config-v1530 CSI-RS-Config-v1530 OPTIONAL, -- Need ON

 uplinkPowerControlDedicatedSCell-v1530

 UplinkPowerControlDedicated-v1530 OPTIONAL, -- Need ON

 laa-SCellConfiguration-v1530 LAA-SCellConfiguration-v1530 OPTIONAL, -- Need ON

 pusch-ConfigDedicated-v1530 PUSCH-ConfigDedicatedScell-v1530 OPTIONAL, -- Cond AUL

 semiStaticCFI-Config-r15 CHOICE{

 release NULL,

 setup CHOICE{

 cfi-Config-r15 CFI-Config-r15,

 cfi-PatternConfig-r15 CFI-PatternConfig-r15

 }

 } OPTIONAL, -- Need ON

 blindPDSCH-Repetition-Config-r15 CHOICE{

 release NULL,

 setup SEQUENCE {

 blindSubframePDSCH-Repetitions-r15 BOOLEAN,

 blindSlotSubslotPDSCH-Repetitions-r15 BOOLEAN,

 maxNumber-SubframePDSCH-Repetitions-r15 ENUMERATED {n4,n6} OPTIONAL, -- Need ON

 maxNumber-SlotSubslotPDSCH-Repetitions-r15 ENUMERATED {n4,n6} OPTIONAL, -- Need ON

 rv-SubframePDSCH-Repetitions-r15 ENUMERATED {dlrvseq1, dlrvseq2} OPTIONAL, -- Need ON

 rv-SlotsublotPDSCH-Repetitions-r15 ENUMERATED {dlrvseq1, dlrvseq2} OPTIONAL, -- Need ON

 numberOfProcesses-SubframePDSCH-Repetitions-r15 INTEGER(1..16) OPTIONAL, -- Need ON

 numberOfProcesses-SlotSubslotPDSCH-Repetitions-r15 INTEGER(1..16) OPTIONAL, -- Need ON

 mcs-restrictionSubframePDSCH-Repetitions-r15 ENUMERATED {n0, n1} OPTIONAL, -- Need ON

 mcs-restrictionSlotSubslotPDSCH-Repetitions-r15 ENUMERATED {n0, n1} OPTIONAL -- Need ON

 }

 } OPTIONAL -- Need ON

 ]],

 [[ spucch-Config-v1550 SPUCCH-Config-v1550 OPTIONAL -- Need ON

 ]],

 [[ soundingRS-UL-ConfigDedicatedAdd-r16 SetupRelease {SoundingRS-UL-ConfigDedicatedAdd-r16}

 OPTIONAL, -- Need ON

 uplinkPowerControlAddSRS-r16 SetupRelease {UplinkPowerControlAddSRS-r16}

 OPTIONAL, -- Need ON

 soundingRS-VirtualCellID-r16 SetupRelease {SoundingRS-VirtualCellID-r16}

 OPTIONAL, -- Need ON

 widebandPRG-r16 SetupRelease {WidebandPRG-r16} OPTIONAL -- Need ON

 ]]

}

PhysicalConfigDedicatedSCell-v1370 ::= SEQUENCE {

 pucch-SCell-v1370 CHOICE{

 release NULL,

 setup SEQUENCE {

 pucch-ConfigDedicated-v1370 PUCCH-ConfigDedicated-v1370 OPTIONAL -- Cond PUCCH-Format4or5

 }

 }

}

PhysicalConfigDedicatedSCell-v13c0 ::= SEQUENCE {

 pucch-SCell-v13c0 CHOICE{

 release NULL,

 setup SEQUENCE {

 pucch-ConfigDedicated-v13c0 PUCCH-ConfigDedicated-v13c0

 }

 }

}

CFI-Config-r15 ::= SEQUENCE {

 cfi-SubframeNonMBSFN-r15 INTEGER (1..4) OPTIONAL, -- Need ON

 cfi-SlotSubslotNonMBSFN-r15 INTEGER (1..3) OPTIONAL, -- Need ON

 cfi-SubframeMBSFN-r15 INTEGER (1..2) OPTIONAL, -- Need ON

 cfi-SlotSubslotMBSFN-r15 INTEGER (1..2) OPTIONAL -- Need ON

}

CFI-PatternConfig-r15 ::= SEQUENCE {

 cfi-PatternSubframe-r15 SEQUENCE (SIZE(10)) OF INTEGER (1..4) OPTIONAL, -- Need ON

 cfi-PatternSlotSubslot-r15 SEQUENCE (SIZE(10)) OF INTEGER (1..3) OPTIONAL -- Need ON

}

LAA-SCellConfiguration-r13 ::= SEQUENCE {

 subframeStartPosition-r13 ENUMERATED {s0, s07},

 laa-SCellSubframeConfig-r13 BIT STRING (SIZE(8))

}

LAA-SCellConfiguration-v1430 ::= SEQUENCE {

 crossCarrierSchedulingConfig-UL-r14 CHOICE {

 release NULL,

 setup SEQUENCE {

 crossCarrierSchedulingConfigLAA-UL-r14 CrossCarrierSchedulingConfigLAA-UL-r14

 }

 } OPTIONAL, -- Cond Cross-Carrier-ConfigUL

 lbt-Config-r14 LBT-Config-r14 OPTIONAL, -- Need ON

 pdcch-ConfigLAA-r14 PDCCH-ConfigLAA-r14 OPTIONAL, -- Need ON

 absenceOfAnyOtherTechnology-r14 ENUMERATED {true} OPTIONAL, -- Need OR

 soundingRS-UL-ConfigDedicatedAperiodic-v1430

 SoundingRS-UL-ConfigDedicatedAperiodic-v1430 OPTIONAL -- Need ON

}

LAA-SCellConfiguration-v1530 ::= SEQUENCE {

 aul-Config-r15 AUL-Config-r15 OPTIONAL, -- Need ON

 pusch-ModeConfigLAA-r15 PUSCH-ModeConfigLAA-r15 OPTIONAL -- Need OR

}

PUSCH-ModeConfigLAA-r15 ::= SEQUENCE {

 laa-PUSCH-Mode1 BOOLEAN,

 laa-PUSCH-Mode2 BOOLEAN,

 laa-PUSCH-Mode3 BOOLEAN

}

LBT-Config-r14 ::= CHOICE{

 maxEnergyDetectionThreshold-r14 INTEGER(-85..-52),

 energyDetectionThresholdOffset-r14 INTEGER(-13..20)

}

CSI-RS-ConfigNZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZP-r11

CSI-RS-ConfigNZPToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-ConfigNZP-r11

CSI-RS-ConfigNZPToAddModList-r15 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r13)) OF CSI-RS-ConfigNZP-r11

CSI-RS-ConfigNZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZPId-r11

CSI-RS-ConfigNZPToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-ConfigNZPId-v1310

CSI-RS-ConfigNZPToReleaseList-r15 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r13)) OF CSI-RS-ConfigNZPId-r13

CSI-RS-ConfigZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZP-r11

CSI-RS-ConfigZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZPId-r11

PhysicalConfigDedicatedSTTI-r15 ::= CHOICE {

 release NULL,

 setup SEQUENCE {

 antennaInfoDedicatedSTTI-r15 AntennaInfoDedicatedSTTI-r15 OPTIONAL, -- Need ON

 antennaInfoUL-STTI-r15 AntennaInfoUL-STTI-r15 OPTIONAL, -- Need ON

 pucch-ConfigDedicated-v1530 PUCCH-ConfigDedicated-v1530 OPTIONAL, -- Need ON

 schedulingRequestConfig-v1530 SchedulingRequestConfig-v1530 OPTIONAL, -- Need ON

 uplinkPowerControlDedicatedSTTI-r15 UplinkPowerControlDedicatedSTTI-r15 OPTIONAL, --Need ON

 cqi-ReportConfig-r15 CQI-ReportConfig-r15 OPTIONAL, -- Need ON

 csi-RS-Config-r15 CSI-RS-Config-r15 OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToReleaseList-r15 CSI-RS-ConfigNZPToReleaseList-r15 OPTIONAL, -- Need ON

 csi-RS-ConfigNZPToAddModList-r15 CSI-RS-ConfigNZPToAddModList-r15 OPTIONAL, -- Need ON

 csi-RS-ConfigZPToReleaseList-r15 CSI-RS-ConfigZPToReleaseList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigZPToAddModList-r11 CSI-RS-ConfigZPToAddModList-r11 OPTIONAL, -- Need ON

 csi-RS-ConfigZP-ApList-r15 CSI-RS-ConfigZP-ApList-r14 OPTIONAL, -- Need ON

 eimta-MainConfig-r12 EIMTA-MainConfig-r12 OPTIONAL, -- Need ON

 eimta-MainConfigServCell-r15 EIMTA-MainConfigServCell-r12 OPTIONAL, -- Need ON

 semiOpenLoopSTTI-r15 BOOLEAN,

 slotOrSubslotPDSCH-Config-r15 SlotOrSubslotPDSCH-Config-r15 OPTIONAL, -- Need ON

 slotOrSubslotPUSCH-Config-r15 SlotOrSubslotPUSCH-Config-r15 OPTIONAL, -- Need ON

 spdcch-Config-r15 SPDCCH-Config-r15 OPTIONAL, -- Need ON

 spucch-Config-r15 SPUCCH-Config-r15 OPTIONAL, -- Need ON

 srs-DCI7-TriggeringConfig-r15 BOOLEAN,

 shortProcessingTime-r15 BOOLEAN,

 shortTTI-r15 ShortTTI-r15 OPTIONAL -- Need ON

 }

}

SoundingRS-AperiodicSet-r14 ::= SEQUENCE{

 srs-CC-SetIndexList-r14

 SEQUENCE (SIZE (1..4)) OF SRS-CC-SetIndex-r14

 OPTIONAL, -- Cond SRS-Trigger-TypeA

 soundingRS-UL-ConfigDedicatedAperiodic-r14

 SoundingRS-UL-ConfigDedicatedAperiodic-r10

}

SoundingRS-AperiodicSetUpPTsExt-r14 ::= SEQUENCE{

 srs-CC-SetIndexList-r14

 SEQUENCE (SIZE (1..4)) OF SRS-CC-SetIndex-r14

 OPTIONAL, -- Cond SRS-Trigger-TypeA

 soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r14

 SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13

}

ShortTTI-r15 ::= SEQUENCE {

 dl-STTI-Length-r15 ShortTTI-Length-r15 OPTIONAL, -- Need OR

 ul-STTI-Length-r15 ShortTTI-Length-r15 OPTIONAL -- Need OR

}

ShortTTI-Length-r15 ::= ENUMERATED {slot, subslot}

SoundingRS-VirtualCellID-r16 ::= SEQUENCE {

 srs-VirtualCellID-r16 INTEGER (0..503),

 srs-VirtualCellID-AllSRS-r16 BOOLEAN

}

WidebandPRG-r16 ::= SEQUENCE {

 widebandPRG-Subframe-r16 BOOLEAN,

 widebandPRG-SlotSubslot-r16 BOOLEAN

}

ResourceReservationConfigDedicatedDL-r16 ::= SEQUENCE {

 resourceReservationDedicatedDL-r16 ResourceReservationConfigDL-r16 OPTIONAL -- Need OP

}

ResourceReservationConfigDedicatedUL-r16 ::= SEQUENCE {

 resourceReservationDedicatedUL-r16 ResourceReservationConfigUL-r16 OPTIONAL -- Need OP

}

-- ASN1STOP

| *PhysicalConfigDedicated* field descriptions |
| --- |
| ***absenceOfAnyOtherTechnology***Presence of this field indicates absence on a long term basis (e.g. by level of regulation) of any other technology sharing the carrier; absence of this field indicates the potential presence of any other technology sharing the carrier, as specified in TS 37.213 [94].  |
| ***additionalSpectrumEmissionPCell***E-UTRAN does not configure this field in this release of the specification. |
| ***antennaInfo***A choice is used to indicate whether the *antennaInfo* is signalled explicitly or set to the default antenna configuration as specified in clause 9.2.4. |
| ***blindSlotSubslotPDSCH-Repetitions***Enables HARQ-less/blind slot or subslot PDSCH repetitions for a UE in a given cell, i.e. back to back slot/subslot PDSCH transmissions for the same transport block. The number of slot/subslot PDSCH transmissions is indicated in the DCI. |
| ***blindSubframePDSCH-Repetitions***Enables HARQ-less/blind subframe PDSCH repetitions for a UE in a given cell, i.e. back to back PDSCH transmissions for the same transport block. The number of PDSCH transmissions is indicated in the DCI. |
| ***ce-14HARQ***Indicates whether 14-HARQ is enabled for HD-FDD BL UE, see TS 36.211 [21], TS 36.212 [22] and TS 36.213 [23]. |
| ***ce-CSI-RS-Feedback***Indicates whether CSI-RS-based CSI feedback is enabled for non-BL UE in CE mode A, see TS 36.213 [23], clause 7.2.2. |
| ***ce-DL-maxTBS***Indicates whether DL TBS of 1736 bits is enabled for HD-FDD BL UE in CE mode A, see TS 36.213 [23], clause TBD. |
| ***ce-HARQ-ACK-Delay***Configures the HARQ ACK delay between different subframe types and absolute subframes when UE is configured with 14 HARQ, see TS 36.212 [22] and TS 36.213 [23]. |
| ***ce-Mode***Indicates the CE mode as specified in TS 36.213 [23]. |
| ***ce-pdsch-pusch-Enhancement-Config***Activation of new numbers of repetitions for PUSCH and modulation restrictions for PDSCH/PUSCH in CE mode A, see TS 36.212 [22] and TS 36.213 [23]. |
| ***cfi-SlotSubslotNonMBSFN***Indicates the semi-static control format indicator for slot/subslot operation in non-MBSFN subframes. |
| ***cfi-SlotSubslotMBSFN***Indicates the semi-static control format indicator for slot/subslot operation in MBSFN subframes. |
| ***cfi-SubframeMBSFN***Indicates the semi-static control format indicator for subframe operation in MBSFN subframes. |
| ***cfi-SubframeNonMBSFN***Indicates the semi-static control format indicator for subframe operation in non-MBSFN subframes. |
| ***cqi-ShortConfigSCell***Indicates whether the CSI (CQI/PMI/RI/PTI/CRI) reporting resource configured by *cqi-ShortConfigSCell* is available upon receiving the SCell activation command for this SCell. E-UTRAN only configures this field when transmission mode 1-8 is configured for the serving cell on this carrier frequency. |
| ***csi-RS-Config***For a serving frequency E-UTRAN does not configure *csi-RS-Config* (includes *zeroTxPowerCSI-RS*) when transmission mode 10 is configured for the serving cell on this carrier frequency. |
| ***csi-RS-ConfigNZPToAddModList***For a serving frequency E-UTRAN configures one or more *CSI-RS-ConfigNZP* only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency. For a serving frequency, EUTRAN configures a maximum number of *CSI-RS-ConfigNZP* in accordance with transmission mode (including CSI processes), eMIMO (including class) and associated UE capabilities (e.g. k-Max, n-MaxList). |
| ***csi-RS-ConfigZP-ApList***The aperiodic ZP CSI-RS for PDSCH rate matching. The field *subframeConfig* is applicable to semi-persistent CSI RS reporting. In other cases, the UE shall ignore field *subframeConfig*. |
| ***csi-RS-ConfigZPToAddModList***For a serving frequency E-UTRAN configures one or more *CSI-RS-ConfigZP* only when transmission mode 10 is configured for the serving cell on this carrier frequency. |
| ***dl-STTI-Length, ul-STTI-Length***Indicates the DL and UL short TTI lengths. Value slot corresponds to 7 OFDM symbols and value subslot corresponds to 2 or 3 OFDM symbols. E-UTRAN configures the same value for all serving cells sending PUCCH feedback on the same cell. If one SCell is configured with short TTI in the group of cells configured to send PUCCH on the same cell, the cell carrying PUCCH shall be configured with short TTI. E-UTRAN can configure different value of *dl-STTI-Length* and *ul-STTI-Length* for serving cells sending PUCCH feedback on different cells. E-UTRAN does not configure the combination {slot,subslot} for {DL,UL}.  |
| ***dummy***This field is not used in the specification. If received it shall be ignored by the UE. |
| ***eimta-MainConfigPCell, eimta-MainConfigSCell***If E-UTRAN configures *eimta-MainConfigPCell* or *eimta-MainConfigSCell* for one serving cell in a frequency band, E-UTRAN configures *eimta-MainConfigPCell* or *eimta-MainConfigSCell* for all serving cells residing on the frequency band. E-UTRAN configures *eimta-MainConfigPCell* or *eimta-MainConfigSCell* only if *eimta-MainConfig* is configured. |
| ***energyDetectionThresholdOffset***Indicates the offset to the default maximum energy detection threshold value. Unit in dB. Value -13 corresponds to -13dB, value -12 corresponds to -12dB, and so on (i.e. in steps of 1dB) as specified in TS 37.213 [94]. |
| ***epdcch-Config***indicates the *EPDCCH-Config* for the cell. E-UTRAN does not configure *EPDCCH-Config* for an SCell that is configured with value *other* for *schedulingCellInfo* in *CrossCarrierSchedulingConfig*. |
| ***k-max***Indicates the maximum number of interfering spatial layers signaled in the assistance information for MUST. Value l1 corresponds to 1 layer, Value l3 corresponds to 3 layers. |
| ***laa-PUSCH-Mode1, laa-PUSCH-Mode2, laa-PUSCH-Mode3***Indicates whether LAA PUSCH mode 1, 2 and/or 3 is configured as specified in TS 36.212 [22], clause 5.3.3.1. |
| ***laa-SCellSubframeConfig***A bit-map indicating LAA SCell subframe configuration, "1" denotes that the corresponding subframe is allocated as MBSFN subframe. The bitmap is interpreted as follows:Starting from the first/leftmost bit in the bitmap, the allocation applies to subframes #1, #2, #3, #4, #6, #7, #8, and #9. |
| ***maxEnergyDetectionThreshold***Indicates the absolute maximum energy detection threshold value. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm) as specified in TS 36.213 [23]. If the field is not configured, the UE shall use a default maximum energy detection threshold value as specified in TS 37.213 [94]. |
| ***maxNumber-SlotSubslotPDSCH-Repetitions***Indicates the maximum number of PDSCH transmissions for slot or subslot PDSCH repetitions.  |
| ***maxNumber-SubframePDSCH-Repetitions***Indicates the maximum number of PDSCH transmissions for subframe PDSCH repetitions.  |
| ***mcs-restrictionSlotSubslotPDSCH-Repetitions***Indicates the MCS restriction in terms of number of non-addressable MSB in the MCS bit-field for slot or subslot PDSCH repetition applicable when k > 1. |
| ***mcs-restrictionSubframePDSCH-Repetitions***Indicates MCS restriction in terms of number of non-addressable MSB in the MCS bit-field for subframe PDSCH repetition applicable when k > 1. |
| ***numberOfProcesses-SlotSubslotPDSCH-Repetitions***Indicates the number of HARQ processes for slot/subslot PDSCH repetition applicable when k > 1 configured per serving cell. |
| ***numberOfProcesses-SubframePDSCH-Repetitions***Indicates the number of HARQ processes for subframe PDSCH repetition applicable when k > 1 configured per serving cell. |
| ***p-a-must***Parameter: , see TS 36.213 [23], clause 5.2. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc. |
| ***pdsch-ConfigDedicated-v1130***For a serving frequency, E-UTRAN configures *pdsch-ConfigDedicated-v1130* only when transmission mode 10 is configured for the serving cell on this carrier frequency. |
| ***pdsch-ConfigDedicated-v1280***For a serving frequency, E-UTRAN configures *pdsch-ConfigDedicated-v1280* only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency. |
| ***pucch-Cell***If present, PUCCH feedback of this SCell is sent on the PUCCH SCell. If absent, PUCCH feedback of this SCell is sent on PCell or PSCell, or if the cell concerns the PUCCH SCell, on the concerned cell. If this field is not modified upon change of PUCCH SCell, the UE shall always send the PUCCH feedback of the concerned SCell using the configured PUCCH SCell. |
| ***pucch-ConfigDedicated***E-UTRAN configures *pucch-ConfigDedicated-r13* only if *pucch-ConfigDedicated* (i.e., without suffix) is not configured. UE shall ignore *pucch-ConfigDedicated-v1020* when *pucch-ConfigDedicated-r13* is configured. |
| ***pucch-SCell***If present, the concerned SCell is the PUCCH SCell. E-UTRAN only configures this field upon SCell addition i.e. this field is only released when the SCell is released. The field is not applicable for an LAA SCell in this release. |
| ***pusch-ConfigDedicated-r13***E-UTRAN configures *pusch-ConfigDedicated-r13* only if *pusch-ConfigDedicated* is not configured. |
| ***pusch-ConfigDedicated-v1250***E-UTRAN configures *pusch-ConfigDedicated-v1250* only if *tpc-SubframeSet* is configured. |
| ***pusch-EnhancementsConfig***Indicates that the UE shall transmit in the PUSCH enhancement mode if *pusch-EnhancementsConfig* is set to *setup*, see TS 36.211 [21] and TS 36.213 [23]. |
| ***resourceReservationConfigDedicatedDL***Indicates whether the DL resource reservation is enabled for the UE, e.g. for NR coexistence. If the field is set to *setup* and *resourceReservationDedicatedDL* is not included, then *resourceReservationConfigCommonDL* in *SystemInformationBlockType29* applies. |
| *resourceReservationConfigDedicatedUL*Indicates whether the UL resource reservation is enabled for the UE, e.g. for NR coexistence. If the field is set to *setup* and *resourceReservationDedicatedUL* is not included, then *resourceReservationConfigCommonUL* in *SystemInformationBlockType29* applies. |
| ***rv-SlotsublotPDSCH-Repetitions***Indicates the RV cycling sequence for slot or subslot PDSCH repetition. Value dlrvseq1 = {0, 0, 0, 0} and value dlrvseq2 = {0, 2, 3, 1}. |
| ***rv-SubframePDSCH-Repetitions***Indicates the RV cycling sequence for subframe PDSCH repetition. Value dlrvseq1 = {0, 0, 0, 0} and value dlrvseq2 = {0, 2, 3, 1}. |
| ***semiOpenLoop, semiOpenLoopSTTI***Value TRUE indicates that semi-open-loop transmission is used for deriving CSI reporting and corresponding PDSCH transmission (DMRS). |
| ***shortProcessingTime***Indicates whether short processing time is configured as specific in TS 36.321 [6]. An SCell can only be configured with short processing if the cell carrying PUCCH for that SCell is configured with short processing time. |
| ***soundingRS-UL-PeriodicConfigDedicatedList***Indicates periodic soundingRS configuration except for the extension sounding symbols of the UpPTs subframe. E-UTRAN configures this field in *PhysicalConfigDedicated* only for the UE indicating support of *ce-SRS-Enhancement-r14* or *ce-SRS-EnhancementWithoutComb4-r14*. E-UTRAN configures this field in *PhysicalConfigDedicatedSCell-r10* only for the UE indicating support of *srs-UpPTS-6sym-r14*. |
| ***soundingRS-UL-PeriodicConfigDedicatedUpPTsExtList***Indicates periodic soundingRS configuration in extension sounding symbols of the UpPTs subframe. E-UTRAN configures this field in *PhysicalConfigDedicated* only for the UE indicating support of *ce-SRS-Enhancement-r14* or *ce-SRS-EnhancementWithoutComb4-r14*. E-UTRAN configures this field in *PhysicalConfigDedicatedSCell-r10* only for the UE indicating support of *srs-UpPTS-6sym-r14*. |
| ***soundingRS-UL-AperiodicConfigDedicatedList***Indicates aperiodic soundingRS configuration except for the extension sounding symbols of the UpPTs subframe. E-UTRAN configures this field in *PhysicalConfigDedicated* only for the UE indicating support of *ce-SRS-Enhancement-r14* or *ce-SRS-EnhancementWithoutComb4-r14*. E-UTRAN configures this field in *PhysicalConfigDedicatedSCell-r10* only for the UE indicating support of *srs-UpPTS-6sym-r14*. |
| ***soundingRS-UL-DedicatedApUpPTsExtList***Indicates aperiodic soundingRS configuration in extension sounding symbols of the UpPTs subframe. E-UTRAN configures this field in *PhysicalConfigDedicated* only for the UE indicating support of *ce-SRS-Enhancement-r14* or *ce-SRS-EnhancementWithoutComb4-r14*. E-UTRAN configures this field in *PhysicalConfigDedicatedSCell-r10* only for the UE indicating support of *srs-UpPTS-6sym-r14*. |
| ***srs-CC-SetIndexList***Indicates the *srs-CC-SetIndex* list which the *soundingRS-UL-ConfigDedicatedAperiodic* and*soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt* belongs to. |
| ***srs-DCI7-TriggeringConfig***Indicates whether SRS triggering via DCI7 is configured. |
| ***srs-VirtualCellID***Indicates the virtual cell ID for SRS. |
| ***srs-VirtualCellID-AllSRS***Value TRUE indicates the configured virtual cell ID is applied to all SRS symbols. Value FALSE indicates the configured virtual cell ID is applied only to additional SRS symbols. |
| ***subframeStartPosition***Indicates possible starting positions of transmission in the first subframe of the DL transmission burst, see TS 36.211 [21]. Value *s0* means the starting position is subframe boundary, *s07* means the starting position is either subframe boundary or slot boundary. |
| ***tpc-PDCCH-ConfigPUCCH***PDCCH configuration for power control of PUCCH using format 3/3A, see TS 36.212 [22]. |
| ***tpc-PDCCH-ConfigPUSCH***PDCCH configuration for power control of PUSCH using format 3/3A, see TS 36.212 [22]. |
| ***typeA-SRS-TPC-PDCCH-Group***Indicates Type A trigger configuration for SRS transmission on a PUSCH-less SCell. E-UTRAN configures the UE with either *typeA-SRS-TPC-PDCCH-Group* or *typeB-SRS-TPC-PDCCH-Group*, if any. |
| ***uplinkPowerControlDedicated***E-UTRAN configures *uplinkPowerControlDedicated-v1130* only if *uplinkPowerControlDedicated* (without suffix) is configured. |
| ***uplinkPowerControlDedicatedSCell***E-UTRAN configures *uplinkPowerControlDedicatedSCell-v1130* only if *uplinkPowerControlDedicatedSCell-r10* is configured for this serving cell. |
| ***widebandPRG-SlotSubslot***Indicates whether the precoding resource block group size is the whole scheduled bandwidth for slot or subslot PDSCH operation as specified in TS 36.213 [23]. |
| ***widebandPRG-Subframe***Indicates whether the precoding resource block group size is the whole scheduled bandwidth for subframe PDSCH operation as specified in TS 36.213 [23]. |

| Conditional presence | Explanation |
| --- | --- |
| *AI-r8* | The field is optionally present, need ON, if *antennaInfoDedicated-r10* is absent. Otherwise the field is not present |
| *AI-r10* | The field is optionally present, need ON, if *antennaInfoDedicated* is absent. Otherwise the field is not present |
| *AperiodicSRS* | If *soundingRS-UL-ConfigDedicatedAperiodic-r10* is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *AperiodicSRSExt* | If *soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13* is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *AUL* | The field is optionally present, need ON, if *aul-config-r15* is present. Otherwise the field is not present. |
| *CE14HARQ* | The field is optionally present, need OR, if *ce-14HARQ-r17* is present. Otherwise the field is not present. |
| *CommonUL* | The field is mandatory present if *ul-Configuration* of *RadioResourceConfigCommonSCell-r10* is present; otherwise it is optional, need ON. |
| *CQI-r8* | The field is optionally present, need ON, if *cqi-ReportConfig-r10* is absent. Otherwise the field is not present |
| *CQI-r10* | The field is optionally present, need ON, if *cqi-ReportConfig* is absent. Otherwise the field is not present |
| *Cross-Carrier-Config* | The field is optionally present, need ON, if *crossCarrierSchedulingConfig-r10* is absent. Otherwise the field is not present |
| *Cross-Carrier-ConfigUL* | The field is optionally present, need ON, if *crossCarrierSchedulingConfig-r10* and *crossCarrierSchedulingConfig-r13* are absent or *schedulingCellInfo* is set to 'own'. Otherwise the field is not present. |
| *PeriodicSRS* | If *soundingRS-UL-ConfigDedicated-r10* is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *PeriodicSRSPCell* | If *soundingRS-UL-ConfigDedicated* is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *PeriodicSRSExt* | If *soundingRS-UL-ConfigDedicatedUpPTsExt-r13* is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *PUCCH-Format4or5* | The field is mandatory present with *pucch-Format-v1370* set to *setup* if *pucch-ConfigDedicated-r13* is configured and *pucch-ConfigDedicated-r13* indicates PUCCH format 4 or PUCCH format 5; otherwise it is not present and the UE shall delete any existing value for this field. |
| *PUCCH-SCell1* | The field is optionally present, need OR, for SCell not configured with *pucch-configDedicated-r13*. Otherwise it is not present. |
| *PUSCH-SCell* | The field is optionally present, need ON, if *pusch-ConfigDedicatedSCell-r10 and pusch-ConfigDedicated-v1130* are absent. Otherwise the field is not present |
| *PUSCH-SCell1* | The field is optionally present, need ON, for SCell not configured with *pucch-configDedicated-r13*. Otherwise it is not present. |
| *SCellAdd* | The field is mandatory present if *cellIdentification* is present; otherwise it is optional, need ON. |
| *SRS-Trigger-TypeA* | The field is mandatory present if *typeA-SRS-TPC-PDCCH-Group-r14* is present. Otherwise the field is not present and the UE shall delete any existing value for this field. |

NOTE 1: During handover, the UE performs a MAC reset, which involves reverting to the default CQI/ SRS/ SR configuration in accordance with clause 5.3.13 and TS 36.321 [6], clauses 5.9 and 5.2. Hence, for these parts of the dedicated radio resource configuration, the default configuration (rather than the configuration used in the source PCell) is used as the basis for the delta signalling that is included in the message used to perform handover.

NOTE 2: Since delta signalling is not supported for the common SCell configuration, E-UTRAN can only add or release the uplink of an SCell by releasing and adding the concerned SCell.

|  |
| --- |
| Start of next change |

### 6.3.2 Radio resource control information elements

<Unchanged text omitted >

Editor’s Note: PUR-Config update needed to implement following agreement:

* Max DL TBS of 1736 bits can be supported for PUR.

#### – *PUR-Config*

The IE *PUR-Config* is used to specify the PUR configuration.

*PUR-Config* information element

-- ASN1START

PUR-Config-r16 ::= SEQUENCE {

 pur-ConfigID-r16 PUR-ConfigID-r16 OPTIONAL, -- Need OR

 pur-ImplicitReleaseAfter-r16 ENUMERATED {n2, n4, n8, spare} OPTIONAL, -- Need OR

 pur-StartTimeParameters-r16 SEQUENCE {

 periodicityAndOffset-r16 PUR-PeriodicityAndOffset-r16,

 startSFN-r16 INTEGER (0..1023),

 startSubFrame-r16 INTEGER (0..9),

 hsfn-LSB-Info-r16 BIT STRING (SIZE(1))

 } OPTIONAL, --Need ON

 pur-NumOccasions-r16 ENUMERATED {one, infinite},

 pur-RNTI-r16 C-RNTI OPTIONAL, -- Need ON

 pur-TimeAlignmentTimer-r16 INTEGER (1..8) OPTIONAL, -- Need OR

 pur-RSRP-ChangeThreshold-r16 SetupRelease {PUR-RSRP-ChangeThreshold-r16} OPTIONAL, -- Need ON

 pur-ResponseWindowTimer-r16 ENUMERATED {sf240, sf480, sf960, sf1920, sf3840, sf5760, sf7680, sf10240} OPTIONAL, -- Need ON

 pur-MPDCCH-Config-r16 PUR-MPDCCH-Config-r16 OPTIONAL, -- Need ON

 pur-PDSCH-FreqHopping-r16 BOOLEAN,

 pur-PUCCH-Config-r16 PUR-PUCCH-Config-r16 OPTIONAL, -- Need ON

 pur-PUSCH-Config-r16 PUR-PUSCH-Config-r16 OPTIONAL, -- Need ON

 ... ,

 [[ pur-PDSCH-maxTBS-r17 BOOLEAN OPTIONAL -- Need ON

 ]]

}

PUR-MPDCCH-Config-r16 ::= SEQUENCE {

 mpdcch-FreqHopping-r16 BOOLEAN,

 mpdcch-Narrowband-r16 INTEGER (1..maxAvailNarrowBands-r13),

 mpdcch-PRB-PairsConfig-r16 SEQUENCE{

 numberPRB-Pairs-r16 ENUMERATED {n2, n4, n6, spare1},

 resourceBlockAssignment-r16 BIT STRING (SIZE(4))

 },

 mpdcch-NumRepetition-r16 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},

 mpdcch-StartSF-UESS-r16 CHOICE {

 fdd ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8, v10},

 tdd ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare1}

 },

 mpdcch-Offset-PUR-SS-r16 ENUMERATED {zero, oneEighth, oneQuarter,

 threeEighth, oneHalf, fiveEighth,

 threeQuarter, sevenEighth}

}

PUR-PUCCH-Config-r16 ::= SEQUENCE {

 n1PUCCH-AN-r16 INTEGER (0..2047) OPTIONAL, -- Need ON

 pucch-NumRepetitionCE-Format1-r16 ENUMERATED {n1, n2, n4, n8} OPTIONAL -- Need ON

}

PUR-PUSCH-Config-r16 ::= SEQUENCE {

 pur-GrantInfo-r16 CHOICE {

 ce-ModeA SEQUENCE {

 numRUs-r16 BIT STRING (SIZE(2)),

 prb-AllocationInfo-r16 BIT STRING (SIZE(10)),

 mcs-r16 BIT STRING (SIZE(4)),

 numRepetitions-r16 BIT STRING (SIZE(3))

 },

 ce-ModeB SEQUENCE {

 subPRB-Allocation-r16 BOOLEAN,

 numRUs-r16 BOOLEAN,

 prb-AllocationInfo-r16 BIT STRING (SIZE(8)),

 mcs-r16 BIT STRING (SIZE(4)),

 numRepetitions-r16 BIT STRING (SIZE(3))

 }

 } OPTIONAL, -- Need ON

 pur-PUSCH-FreqHopping-r16 BOOLEAN,

 p0-UE-PUSCH-r16 INTEGER (-8..7),

 alpha-r16 Alpha-r12,

 pusch-CyclicShift-r16 ENUMERATED {n0, n6},

 pusch-NB-MaxTBS-r16 BOOLEAN,

 locationCE-ModeB-r16 INTEGER (0..5) OPTIONAL -- Cond SubPRB

}

PUR-RSRP-ChangeThreshold-r16 ::= SEQUENCE {

 increaseThresh-r16 RSRP-ChangeThresh-r16,

 decreaseThresh-r16 RSRP-ChangeThresh-r16 OPTIONAL --Need OP

}

RSRP-ChangeThresh-r16 ::= ENUMERATED {dB4, dB6, dB8, dB10, dB14, dB18, dB22, dB26, dB30, dB34, spare6, spare5, spare4, spare3, spare2, spare1}

-- ASN1STOP

|  |
| --- |
| *PUR-Config* field descriptions |
| ***alpha***Parameter: *αc*(3). See TS 36.213 [23], clause 5.1.1.1.  |
| ***hsfn-LSB-Info***Indicates the LSB of the H-SFN corresponding to the last subframe of the first transmission of *RRCConnectionRelease* message containing *pur-Config*. |
| ***locationCE-ModeB***PRB location within the narrowband when PUSCH sub-PRB resource allocation is enabled for PUR grant in CE mode B. |
| ***mpdcch-FreqHopping***Frequency hopping activation/deactivation for MPDCCH. See TS 36.213 [23]. |
| ***mpdcch-Narrowband***Indicates the index of a narrowband on which the UE monitors for MPDCCH, see TS 36.213 [23], clause 9.1.5. Field values (1..*maxAvailNarrowBands-r13*) correspond to narrowband indices (0..*maxAvailNarrowBands-r13*-1) as specified in TS 36.211 [21]. |
| ***mpdcch-NumRepetition***Maximum number of repetitions levels for UE-SS for MPDCCH, see TS 36.213 [23]. |
| ***mpdcch-Offset-PUR-SS***Starting subframes configuration of the MPDCCH search space for PUR, see TS 36.213 [23]. |
| ***mpdcch-PRB-PairsConfig***Indicates the configuration of physical resource-block pairs used for MPDCCH. See TS 36.213 [23]. *mpdcch-PRB-Pairs* indicates the number of PRB pairs. Value n2 corresponds to 2 PRB pairs; n4 corresponds to 4 PRB pairs and so on. *resourceBlockAssignment*indicates the index to a specific combination of PRB pair for MPDCCH set. See TS 36.213 [23], clause 9.1.4.4. |
| ***mpdcch-StartSF-UESS***Starting subframe configuration for an MPDCCH PUR search space, see TS 36.213 [23]. Value v1 corresponds to 1, value v1dot5 corresponds to 1.5, and so on. |
| ***n1PUCCH-AN***Indicates UE-specific PUCCH AN resource offset, see TS 36.213 [23], clause 10.1. |
| ***p0-UE-PUSCH***Parameter: P0\_UE\_PUSCH,c (3). See TS 36.213 [23], clause 5.1.1.1, unit dB. |
| ***pucch-NumRepetitionCE-Format1***Number of PUCCH repetitions for PUCCH format 1/1a, see TS 36.211 [21] and TS 36.213 [23]. When *pur-GrantInfo* is set to *ce-ModeA*, value n1 corresponds to 1 repetition, value n2 corresponds to 2 repetitions, and so on. When *pur-GrantInfo* is set to *ce-ModeB*, actual value corresponds to 4 \* indicated value. |
| ***pusch-CyclicShift***Parameter: $n\_{cs,λ}.$See TS 36.211 [21] clause 5.5.2.1.1. Value n0 corresponds to 0 and n6 corresponds to 6. |
| ***pusch-NB-MaxTBS***Activation of 2984 bits maximum PUSCH TBS in 1.4 MHz in CE mode A, see TS 36.212 [22] and TS 36.213 [23]. |
| ***pur-GrantInfo***Indicates UL grant for transmission using PUR. Field set to *ce-ModeA* indicates the PUR grant is for CE Mode A and the field set to *ce-ModeB* indicates the PUR grant is for CE Mode B. *numRUs* indicates DCI field for PUSCH number of resource units, see TS 36.213 [23] clause 8.1.6. *prbAllocationInfo* indicates DCI field for PUSCH resource block assignment, see TS 36.212 [22], clause 5.3.3.1.10 (CE Mode A) and clause 5.3.3.1.11 (CE Mode B). *mcs* indicates DCI field for PUSCH modulation and coding scheme, see TS 36.213 [23] clause 8.6. *numRepetitions* indicates DCI field for PUSCH repetition number, see TS 36.213 [23] clause 8.0.For CE Mode A, *numRUs* set to '00' indicates use of full-PRB resource allocation, otherwise sub-PRB resource allocation as defined in TS 36.213 [23], clause 8.1.6. For CE Mode B, *subPRB-Allocation* indicates whether sub-PRB resource allocation is used. |
| ***pur-ImplicitReleaseAfter***Number of consecutive PUR occasions that can be skipped before implicit release, as specified in 5.3.3.20. Value *n2* corresponds to 2 PUR occasions, value *n4* corresponds to 4 PUR occasions and so on.  |
| ***pur-NumOccasions***Number of PUR occasions. Value *one* corresponds to 1 PUR occasion, and value *infinite* corresponds to an infinite number of PUR occasions. |
| ***pur-PDSCH-FreqHopping***Frequency hopping activation/deactivation for PDSCH. See TS 36.213 [23]. |
| ***pur-PDSCH-maxTBS***Indicates whether DL TBS of 1736 bits is enabled for HD-FDD BL UE in CE mode A, see TS 36.213 [23], clause TBD. |
| ***pur-PeriodicityAndOffset***Indicates the periodicity for the PUR occasions and time offset until the first PUR occasion. |
| ***pur-PUSCH-FreqHopping***Frequency hopping activation/deactivation for PUSCH. See TS 36.213 [23]. |
| ***pur-ResponseWindowTimer***PUR MPDCCH search space window duration. See TS 36.321 [6] and TS 36.213 [23]. Value in subframes. Value *sf240* corresponds to 240 subframes, value *sf480* corresponds to 480 subframes and so on. |
| ***pur-RSRP-ChangeThreshold***Indicates the threshold(s) of change in serving cell RSRP in dB for TA validation. Value dB4 corresponds to 4 dB, value dB6 corresponds to 6 dB and so on. When *pur-RSRP-ChangeThreshold* is set to *setup*, if *decreaseThresh* is absent the value of *increaseThresh* is also used for *decreaseThresh*.  |
| ***pur-TimeAlignmentTimer***Indicates the idle mode TA timer in seconds for TA validation. Actual value = indicated value \* PUR periodicity. |

| Conditional presence | Explanation |
| --- | --- |
| *SubPRB* | This field is optionally present, need ON, if *subPRB-Allocation* is set to TRUE; otherwise the field is not present and UE shall delete any existing value for this field. |

|  |
| --- |
| Start of next change |

### 6.3.6 Other information elements

<Unchanged text omitted >

Editor’s Note: Expect UE-EUTRA-Capability will need to be updated to include capability for 14 HARQ and larger DL TBS. Wait for input from RAN1.

#### – *UE-EUTRA-Capability*

The IE *UE-EUTRA-Capability* is used to convey the E-UTRA UE Radio Access Capability Parameters, see TS 36.306 [5], and the Feature Group Indicators for mandatory features (defined in Annexes B.1 and C.1) to the network. The IE *UE-EUTRA-Capability* is transferred in E-UTRA or in another RAT.

NOTE 0: For (UE capability specific) guidelines on the use of keyword OPTIONAL, see Annex A.3.5.

|  |
| --- |
| Start of next change |

### 6.7.2 NB-IoT Message definitions

<Unchanged text omitted >

Editor’s Note: Depending on the outcome of the following FFS, RRCConnectionReestablishmentComplete message may need changes.

* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.

#### – *RRCConnectionReestablishmentComplete-NB*

The *RRCConnectionReestablishmentComplete-NB* message is used to confirm the successful completion of an RRC connection re-establishment.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionReestablishmentComplete-NB* message

-- ASN1START

RRCConnectionReestablishmentComplete-NB ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcConnectionReestablishmentComplete-r13 RRCConnectionReestablishmentComplete-NB-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionReestablishmentComplete-NB-r13-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-NB-v1470-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-NB-v1470-IEs ::= SEQUENCE {

 measResultServCell-r14 MeasResultServCell-NB-r14 OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-NB-v1610-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-NB-v1610-IEs ::= SEQUENCE {

 rlf-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 anr-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionReestablishmentComplete-NB field descriptions* |
| --- |
| ***anr-InfoAvailable***Indicates the availability of ANR measurement information. |
| ***measResultServCell***This field refers to the last idle mode measurement results taken of the serving cell. |
| ***rlf-InfoAvailable***Indicates the availability of radio link failure related information. |

|  |
| --- |
| Start of next change |

### 6.7.2 NB-IoT Message definitions

<Unchanged text omitted >

Editor’s Note: Depending on the outcome of the following FFS, RRCConnectionResumeComplete message may need changes.

* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.

#### – *RRCConnectionResumeComplete-NB*

The *RRCConnectionResumeComplete-NB* message is used to confirm the successful completion of an RRC connection resumption

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionResumeComplete-NB* message

-- ASN1START

RRCConnectionResumeComplete-NB ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcConnectionResumeComplete-r13 RRCConnectionResumeComplete-NB-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionResumeComplete-NB-r13-IEs ::= SEQUENCE {

 selectedPLMN-Identity-r13 INTEGER (1..maxPLMN-r11) OPTIONAL,

 dedicatedInfoNAS-r13 DedicatedInfoNAS OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-NB-v1470-IEs OPTIONAL

}

RRCConnectionResumeComplete-NB-v1470-IEs ::= SEQUENCE {

 measResultServCell-r14 MeasResultServCell-NB-r14 OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-NB-v1610-IEs OPTIONAL

}

RRCConnectionResumeComplete-NB-v1610-IEs ::= SEQUENCE {

 rlf-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 anr-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionResumeComplete-NB* field descriptions |
| --- |
| ***anr-InfoAvailable***Indicates the availability of ANR measurement information. |
| ***measResultServCell***This field refers to the last idle mode measurement results taken of the serving cell. |
| ***rlf-InfoAvailable***Indicates the availability of radio link failure related information. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* included in *SystemInformationBlockType1-NB*. 1 if the 1st PLMN is selected from the *plmn-IdentityList* included in SIB1-NB, 2 if the 2nd PLMN is selected from the *plmn-IdentityList* included in SIB1-NB and so on. |

|  |
| --- |
| Start of next change |

### 6.7.2 NB-IoT Message definitions

<Unchanged text omitted >

Editor’s Note: Depending on the outcome of the following FFS, RRCConnectionSetupComplete message may need changes.

* FFS whether to introduce new UE report and/or whether to mandate support of existing Msg5 reporting.

#### – *RRCConnectionSetupComplete-NB*

The *RRCConnectionSetupComplete-NB* message is used to confirm the successful completion of an RRC connection establishment.

Signalling radio bearer: SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionSetupComplete-NB* message

-- ASN1START

RRCConnectionSetupComplete-NB ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE{

 rrcConnectionSetupComplete-r13 RRCConnectionSetupComplete-NB-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionSetupComplete-NB-r13-IEs ::= SEQUENCE {

 selectedPLMN-Identity-r13 INTEGER (1..maxPLMN-r11),

 s-TMSI-r13 S-TMSI OPTIONAL,

 registeredMME-r13 RegisteredMME OPTIONAL,

 dedicatedInfoNAS-r13 DedicatedInfoNAS,

 attachWithoutPDN-Connectivity-r13 ENUMERATED {true} OPTIONAL,

 up-CIoT-EPS-Optimisation-r13 ENUMERATED {true} OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-NB-v1430-IEs OPTIONAL

}

RRCConnectionSetupComplete-NB-v1430-IEs ::= SEQUENCE {

 gummei-Type-r14 ENUMERATED { mapped} OPTIONAL,

 dcn-ID-r14 INTEGER (0..65535) OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-NB-v1470-IEs OPTIONAL

}

RRCConnectionSetupComplete-NB-v1470-IEs ::= SEQUENCE {

 measResultServCell-r14 MeasResultServCell-NB-r14 OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-NB-v1610-IEs OPTIONAL

}

RRCConnectionSetupComplete-NB-v1610-IEs ::= SEQUENCE {

 ng-5G-S-TMSI-r16 NG-5G-S-TMSI-r15 OPTIONAL,

 registeredAMF-r16 RegisteredAMF-r15 OPTIONAL,

 gummei-Type-v1610 ENUMERATED {mappedFrom5G} OPTIONAL,

 guami-Type-r16 ENUMERATED {native, mapped} OPTIONAL,

 s-NSSAI-list-r16 SEQUENCE(SIZE (1..maxNrofS-NSSAI-r15)) OF

 S-NSSAI-r15 OPTIONAL,

 ng-U-DataTransfer-r16 ENUMERATED {true} OPTIONAL,

 up-CIoT-5GS-Optimisation-r16 ENUMERATED {true} OPTIONAL,

 rlf-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 anr-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 pur-ConfigID-r16 PUR-ConfigID-NB-r16 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionSetupComplete-NB* field descriptions |
| --- |
| ***anr-InfoAvailable***This field is used to indicate the availability of ANR measurement information. |
| ***attachWithoutPDN-Connectivity***This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers, TS 24.301 [35].  |
| ***dcn-ID***The Dedicated Core Network Identity, see TS 23.401 [41]. |
| ***guami-Type***This field is used to indicate whether the GUAMI included is native (derived from native 5G-GUTI) or mapped (from EPS, derived from EPS GUTI) as specified in TS 24.501 [95]. |
| ***gummei-Type***This field is used to indicate that the GUMMEI included is mapped (from 2G/3G identifiers or 5G identifiers) as indicated by the upper layers, TS 24.301 [35] and TS 24.501 [95]. The value *mapped* indicates the GUMMEI is mapped from 2G/3G identifiers, and *mappedFrom5G* indicates the GUMMEI is mapped from 5G identifiers. A UE shall not include both *gummei-Type-r14* and *gummei-Type-v1610*. |
| ***measResultServCell***This field refers to the last idle mode measurement results taken of the serving cell. |
| ***ng-U-DataTransfer***This field is included when the UE supports NG-U data transfer, as indicated by the upper layers, see TS 24.501 [95]. |
| ***registeredAMF***This field is used to transfer the GUAMI of the AMF where the UE is registered, as provided by upper layers, see TS 23.003 [27]. |
| ***registeredMME***This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers. |
| ***rlf-InfoAvailable***This field is used to indicate the availability of radio link failure related information. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* included in *SystemInformationBlockType1-NB*. 1 if the 1st PLMN is selected from the *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the *plmn-IdentityList* included in SIB1 and so on. |
| ***s-NSSAI-List***This field is a list of S-NSSAI as indicated by the upper layers. The UE can report up to eight S-NSSAI per NSSAI, see TS 23.003 [27]. |
| ***up-CIoT-5GS-Optimisation***This field is included when the UE supports User plane CIoT 5GS Optimisation, as indicated by the upper layers, see TS 24.501 [95]. |
| ***up-CIoT-EPS-Optimisation***This field is included when the UE supports S1-U data transfer or the User plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35]. |

|  |
| --- |
| Start of next change |

#### 6.7.3.1 NB-IoT System information blocks

<Unchanged text omitted >

Editor’s Note: SIB3-NB updates needed to implement following agreement:

* Configuration of the criteria to start the measurements is supported.
* The configuration of the criteria for starting the measurements include a serving cell NRSRP threshold. FFS how to address variance (as agreed last meeting)
* The configuration of the criteria for starting the measurements is provided via broadcast signalling.

#### – *SystemInformationBlockType3-NB*

The IE *SystemInformationBlockType3-NB* contains cell re-selection information common for intra-frequency, and inter-frequency cell re-selection as well as intra-frequency cell re-selection information other than neighbouring cell related.

*SystemInformationBlockType3-NB* information element

-- ASN1START

SystemInformationBlockType3-NB-r13 ::= SEQUENCE {

 cellReselectionInfoCommon-r13 SEQUENCE {

 q-Hyst-r13 ENUMERATED {

 dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,

 dB12, dB14, dB16, dB18, dB20, dB22, dB24

 }

 },

 cellReselectionServingFreqInfo-r13 SEQUENCE {

 s-NonIntraSearch-r13 ReselectionThreshold

 },

 intraFreqCellReselectionInfo-r13 SEQUENCE {

 q-RxLevMin-r13 Q-RxLevMin,

 q-QualMin-r13 Q-QualMin-r9 OPTIONAL, -- Need OP

 p-Max-r13 P-Max OPTIONAL, -- Need OP

 s-IntraSearchP-r13 ReselectionThreshold,

 t-Reselection-r13 T-Reselection-NB-r13

 },

 freqBandInfo-r13 NS-PmaxList-NB-r13 OPTIONAL, -- Need OR

 multiBandInfoList-r13 SEQUENCE (SIZE (1..maxMultiBands)) OF

 NS-PmaxList-NB-r13 OPTIONAL, -- Need OR

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...,

 [[ intraFreqCellReselectionInfo-v1350 IntraFreqCellReselectionInfo-NB-v1350 OPTIONAL -- Cond Qrxlevmin

 ]],

 [[ intraFreqCellReselectionInfo-v1360 IntraFreqCellReselectionInfo-NB-v1360 OPTIONAL -- Need OR

 ]],

 [[ intraFreqCellReselectionInfo-v1430 IntraFreqCellReselectionInfo-NB-v1430 OPTIONAL -- Need OR

 ]],

 [[ cellReselectionInfoCommon-v1450 CellReselectionInfoCommon-NB-v1450 OPTIONAL -- Need OR

 ]],

 [[ nsss-RRM-Config-r15 NSSS-RRM-Config-NB-r15 OPTIONAL, -- Need OR

 npbch-RRM-Config-r15 ENUMERATED {enabled} OPTIONAL -- Need OR

 ]]

}

IntraFreqCellReselectionInfo-NB-v1350 ::= SEQUENCE {

 delta-RxLevMin-v1350 INTEGER (-8..-1)

}

IntraFreqCellReselectionInfo-NB-v1360 ::= SEQUENCE {

 s-IntraSearchP-v1360 ReselectionThreshold-NB-v1360

}

IntraFreqCellReselectionInfo-NB-v1430 ::= SEQUENCE {

 powerClass14dBm-Offset-r14 ENUMERATED {dB-6, dB-3, dB3, dB6, dB9, dB12} OPTIONAL, -- Need OP

 ce-AuthorisationOffset-r14 ENUMERATED {dB5, dB10, dB15, dB20, dB25, dB30, dB35} OPTIONAL -- Need OP

}

CellReselectionInfoCommon-NB-v1450 ::= SEQUENCE {

 s-SearchDeltaP-r14 ENUMERATED {dB6, dB9, dB12, dB15}

}

-- ASN1STOP

| *SystemInformationBlockType3-NB* field descriptions |
| --- |
| ***ce-AuthorisationOffset***Parameter "Qoffsetauthorization" in TS 36.304 [4]. Value in dB. Value dB5 corresponds to 5 dB, dB10 corresponds to 10 dB and so on.If the field is absent, the UE applies the value of ce-*authorisationOffset* in *SystemInformationBlockType1-NB*.  |
| ***multiBandInfoList***A list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 36.101 [42], clause 6.2.4F, applicable for the intra-frequency neighbouring NB-IoT cells if the UE selects the frequency band from *freqBandIndicator* in *SystemInformationBlockType1-NB*. |
| ***npbch-RRM-Config***For FDD: Configuration for NPBCH-based RRM measurements. See TS 36.214 [24].If enabled, NPBCH can be used in addition to NRS for RRM measurements for serving cell.  |
| ***nsss-RRM-Config***For FDD: Configuration for NSSS-based RRM measurements for the serving cell. |
| ***powerClass14dBm-Offset***Parameter "Poffset" in TS 36.304 [4], only applicable for UE supporting *powerClassNB-14dBm*. Value in dB. Value dB-6 corresponds to -6 dB, dB-3 corresponds to -3 dB and so on. If the field is absent, the UE applies the (default) value of 0 dB for "Poffset" in TS 36.304 [4]. |
| ***p-Max***Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability. |
| ***q-Hyst***Parameter *Qhyst* in TS 36.304 [4], Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on. |
| ***q-QualMin***Parameter "Qqualmin" in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin. |
| ***q-RxLevMin, delta-RxLevMin***Parameter "Qrxlevmin" in TS 36.304 [4], applicable for intra-frequency neighbour cells. If *delta-RxLevMin* is not included, actual value Qrxlevmin = *q-RxLevMin* \* 2 [dBm]. If *delta-RxLevMin* is included, actual value Qrxlevmin = (*q-RxLevMin* + *delta-RxLevMin*) \* 2 [dBm]. |
| ***s-IntraSearchP***Parameter "SIntraSearchP" in TS 36.304 [4].In case *s-IntraSearchP-v1360* is included, the UE shall ignore *s-IntraSearchP* (i.e. without suffix). |
| ***s-NonIntraSearch***Parameter "SnonIntraSearchP" in TS 36.304 [4]. |
| ***s-SearchDeltaP***Parameter "SSearchDeltaP" in TS 36.304 [4]. This parameter is only applicable for UEs supporting relaxed monitoring as specified in TS 36.306 [5]. Value dB6 corresponds to 6 dB, dB9 corresponds to 9 dB and so on. |
| ***t-Reselection***Parameter "TreselectionNB-IoT\_Intra" in TS 36.304 [4]. |

| Conditional presence | Explanation |
| --- | --- |
| Qrxlevmin | This field is optionally present, Need OR, if *q-RxLevMin* is set to the minimum value. Otherwise the field is not present. |

|  |
| --- |
| Start of next change |

#### 6.7.3.1 NB-IoT System information blocks

<Unchanged text omitted >

Editor’s Note: Expect SIB22-NB will be updated to include implement following agreements:

* Rel-17 paging carriers and the legacy paging carriers should be exclusive.
* Rel-17 paging carrier configuration is provided in broadcast signalling.
* Working assumption: UE metric for determining carrier suitability and selection is based on measured NRSRP. FFS whether to use a hysteresis/longer averaging/timer
* Support coverage or carrier specific DRX configurations, FFS details.

#### – *SystemInformationBlockType22-NB*

The IE *SystemInformationBlockType22-NB* contains radio resource configuration for paging and random access procedure on non-anchor carriers.

*SystemInformationBlockType22-NB* information element

-- ASN1START

SystemInformationBlockType22-NB-r14 ::= SEQUENCE {

 dl-ConfigList-r14 DL-ConfigCommonList-NB-r14 OPTIONAL, -- Need OR

 ul-ConfigList-r14 UL-ConfigCommonList-NB-r14 OPTIONAL, -- Need OR

 pagingWeightAnchor-r14 PagingWeight-NB-r14 OPTIONAL, -- Cond pcch-config

 nprach-ProbabilityAnchorList-r14 NPRACH-ProbabilityAnchorList-NB-r14 OPTIONAL, -- Cond nprach-config

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...,

 [[ mixedOperationModeConfig-r15 SEQUENCE {

 dl-ConfigListMixed-r15 DL-ConfigCommonList-NB-r14 OPTIONAL, -- Cond dl-ConfigList

 ul-ConfigListMixed-r15 UL-ConfigCommonList-NB-r14 OPTIONAL, -- Cond ul-ConfigList

 pagingDistribution-r15 ENUMERATED {true} OPTIONAL, -- Need OR

 nprach-Distribution-r15 ENUMERATED {true} OPTIONAL -- Need OR

 } OPTIONAL, -- Need OR

 ul-ConfigList-r15 UL-ConfigCommonListTDD-NB-r15 OPTIONAL -- Cond TDD

 ]],

 [[ dl-ConfigList-v17xy DL-ConfigCommonList-NB-v17xy OPTIONAL -- Need OR

 ]]

}

DL-ConfigCommonList-NB-r14 ::= SEQUENCE (SIZE (1.. maxNonAnchorCarriers-NB-r14)) OF

 DL-ConfigCommon-NB-r14

UL-ConfigCommonList-NB-r14 ::= SEQUENCE (SIZE (1.. maxNonAnchorCarriers-NB-r14)) OF

 UL-ConfigCommon-NB-r14

UL-ConfigCommonListTDD-NB-r15 ::= SEQUENCE (SIZE (1.. maxNonAnchorCarriers-NB-r14)) OF

 UL-ConfigCommonTDD-NB-r15

DL-ConfigCommon-NB-r14 ::= SEQUENCE {

 dl-CarrierConfig-r14 DL-CarrierConfigCommon-NB-r14,

 pcch-Config-r14 PCCH-Config-NB-r14 OPTIONAL, -- Need OR

 ...,

 [[ wus-Config-r15 WUS-ConfigPerCarrier-NB-r15 OPTIONAL -- Cond WUS

 ]],

 [[ gwus-Config-r16 WUS-ConfigPerCarrier-NB-r15 OPTIONAL -- Cond GWUS

 ]]

}

PCCH-Config-NB-r14 ::= SEQUENCE {

 npdcch-NumRepetitionPaging-r14 ENUMERATED {

 r1, r2, r4, r8, r16, r32, r64, r128,

 r256, r512, r1024, r2048,

 spare4, spare3, spare2, spare1} OPTIONAL, -- Need OP

 pagingWeight-r14 PagingWeight-NB-r14 DEFAULT w1,

 ...

}

PagingWeight-NB-r14 ::= ENUMERATED {w1, w2, w3, w4, w5, w6, w7, w8,

 w9, w10, w11, w12, w13, w14, w15, w16}

UL-ConfigCommon-NB-r14 ::= SEQUENCE {

 ul-CarrierFreq-r14 CarrierFreq-NB-r13,

 nprach-ParametersList-r14 NPRACH-ParametersList-NB-r14 OPTIONAL, -- Need OR

 ...,

 [[ nprach-ParametersListEDT-r15 NPRACH-ParametersList-NB-r14 OPTIONAL -- Cond EDT

 ]]

}

UL-ConfigCommonTDD-NB-r15 ::= SEQUENCE {

 tdd-UL-DL-AlignmentOffset-r15 TDD-UL-DL-AlignmentOffset-NB-r15,

 nprach-ParametersListTDD-r15 NPRACH-ParametersListTDD-NB-r15 OPTIONAL, -- Need OR

 ...

}

NPRACH-ProbabilityAnchorList-NB-r14 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF

 NPRACH-ProbabilityAnchor-NB-r14

NPRACH-ProbabilityAnchor-NB-r14 ::= SEQUENCE {

 nprach-ProbabilityAnchor-r14 ENUMERATED {

 zero, oneSixteenth, oneFifteenth, oneFourteenth,

 oneThirteenth, oneTwelfth, oneEleventh, oneTenth,

 oneNinth, oneEighth, oneSeventh, oneSixth,

 oneFifth, oneFourth, oneThird, oneHalf}

 OPTIONAL -- Need OP

}

DL-ConfigCommon-NB-v17xy ::= SEQUENCE {

 Editors note: Details FFS

}

-- ASN1STOP

| *SystemInformationBlockType22-NB* field descriptions |
| --- |
| ***dl-CarrierConfig***For FDD: Provides the configuration of the DL non-anchor carrier.For TDD: Provides the configuration of the non-anchor carrier. |
| ***dl-ConfigList, dl-ConfigListMixed***For FDD: List of DL non-anchor carriers and associated configuration that can be used for paging and/or random access. E-UTRAN configures DL non-anchor carriers operating in mixed operation mode only in *dl-ConfigListMixed* and only a UE that supports mixed operation mode uses the carriers in *dl-ConfigListMixed*. A given carrier is either signalled in the *dl-ConfigList* or in *dl-ConfigListMixed*.If *dl-ConfigListMixed* is present and at least one of the carriers in *dl-ConfigListMixed* is configured for paging:- If *pagingDistribution* is present, the UE supporting mixed operation mode creates a combined list of DL carriers for paging by appending *dl-ConfigListMixed* to the *dl-ConfigList* while maintaining the order among *dl-ConfigList* and *dl-ConfigListMixed*; the total number of signalled DL non-anchor carriers cannot be more than *maxNonAnchorCarriers-NB-r14*.- If *pagingDistribution* is absent, the UE supporting mixed operation mode uses the list of DL carriers for paging provided in *dl-ConfigListMixed* and considers *pagingWeightAncho*r being set to w0, i.e. the anchor carrier is not used*.*Otherwise, the *pagingDistribution* field is not applicable and the UE shall ignore the value.For TDD: List of non-anchor carriers and associated configuration that can be used for paging and/or random access. |
| ***gwus-Config***For FDD: Carrier specific GWUS Configuration.If both *gwus-Config* and *wus-Config* are present for the carrier, E-UTRAN configures the same value for both fields. |
| ***mixedOperationModeConfig***For FDD: Provides the configuration of DL and UL non-anchor carriers that can be used for paging and random access by a UE that supports mixed operation mode.For TDD: This parameter is absent. |
| ***npdcch-NumRepetitionPaging***Maximum number of repetitions for NPDCCH common search space (CSS) for paging, see TS 36.213 [23], clause 16.6.If the field is absent, the value *of npdcch-NumRepetitionPaging* configured in *SystemInformationBlockType2-NB* in IE *pcch-Config* applies. |
| ***nprach-Distribution***Indicates which UL carriers a UE supporting mixed operation mode uses for random access as defined in description of *ul-ConfigList, ul-ConfigListMixed*.  |
| ***nprach-ParametersList, nprach-ParametersList-EDT***Configure NPRACH parameters for each NPRACH resource on one non-anchor UL carrier. Up to three NPRACH resources can be configured on one non-anchor UL carrier. Each NPRACH resource is associated with a different number of NPRACH repetitions.NPRACH resources in *nprach-ParametersListEDT* are used to initiateEDT. Each NPRACH resource is associated with a maximum TBS signalled in the corresponding entry of *edt-TBS-InfoList* in *SystemInformationBlockType2-NB*.E-UTRAN includes the same number of entries, and listed in the same order, as in *nprach-ParametersList* in *SystemInformationBlockType2-NB*. |
| ***nprach-ParametersListTDD***For TDD: Configure NPRACH parameters for each NPRACH resource on one non-anchor UL carrier. Up to three NPRACH resources can be configured on one non-anchor UL carrier. Each NPRACH resource is associated with a different number of NPRACH repetitions.E-UTRAN includes the same number of entries in *nprach-ParametersListTDD*, and listed in the same order, as in *nprach-ParametersListTDD* in *SystemInformationBlockType2-NB*.. |
| ***nprach-ProbabilityAnchor***Configure the selection probability for the anchor carrier NPRACH resource, see TS 36.321 [6]. Value zero corresponds to a probability of 0, oneSixteenth corresponds to the probability of 1/16, oneFifteenth corresponds to the probability of 1/15, and so on.If the field is absent, the selection probability of the anchor carrier NPRACH resource is 1.All non-anchor carriers NPRACH resources have equal probability between them.If there is no NPRACH resource defined on the anchor carrier for one repetition level in *nprach-ParametersList-EDT*, (respectively *nprach-ParametersListFmt2*, *nprach-ParametersListFmt2-EDT*), the UE shall use the value 'zero' and ignore the signalled value of *nprach-ProbabilityAnchor* for this repetition level for the NPRACH resources defined by *nprach-ParametersList-EDT* (respectively *nprach-ParametersListFmt2*, *nprach-ParametersListFmt2-EDT*). |
| ***nprach-ProbabilityAnchorList***Configures the selection probability for each NPRACH resource on the anchor carrier.E-UTRAN includes the same number of entries, and listed in the same order, as in *nprach-ParametersList* in *SystemInformationBlockType2-NB.* |
| ***pagingDistribution***Indicates which DL carriers a UE supporting mixed operation mode monitors for paging as defined in description of *dl-ConfigList, dl-ConfigListMixed*. |
| ***pagingWeight***Weight of the non-anchor paging carrier for uneven paging load distribution across the carriers. Value w1 corresponds to a relative weight of 1, w2 corresponds to a relative weight of 2, and so on.The paging load for a carrier 'i' is equal to w(i)/W where i is equal to 0 for the anchor carrier and equal to the index of the carrier in the *dl-ConfigList* / *dl-ConfigListMixed* for a non-anchor carrier, W is the sum of the weights of all paging carriers.To avoid correlation between paging carrier and paging occasion, the weights should be assigned such that: nB \* W <= 16384. |
| ***pagingWeightAnchor***Weight of the anchor carrier for uneven paging load distribution across the carriers. Value w1 corresponds to a relative weight of 1, w2 corresponds to a relative weight of 2, and so on.If the field is absent, the (default) value of w0 is applied, i.e. the anchor carrier is not used for paging. |
| ***pcch-Config***Configure the PCCH parameters for the non-anchor DL carrier. |
| ***tdd-UL-DL-AlignmentOffset***Indicates the offset between the UL carrier frequency center with respect to DL carrier frequency center for the non-anchor carrier. |
| ***ul-CarrierFreq***For FDD: UL carrier frequency of the non-anchor carrier as defined in TS 36.101 [42], clause 5.7.3F.For TDD: This field is absent and the uplink carrier frequency is same as the downlink frequency. |
| ***ul-ConfigList, ul-ConfigListMixed***For FDD: List of UL non-anchor carriers and associated configuration that can be used for random access. E-UTRAN configures UL non-anchor carriers operating in mixed operation mode only in *ul-ConfigListMixed* and only a UE that supports mixed operation mode uses the carriers in *ul-ConfigListMixed*. A given carrier is either signalled in the *ul-ConfigList* or in *ul-ConfigListMixed*.If *ul-ConfigListMixed* is present and at least one of the carriers in *ul-ConfigListMixed* is configured for random access:- If *nprach-Distribution* is present, the UE supporting mixed operation mode creates a combined list of UL carriers for random access by appending *ul-ConfigListMixed* to the *ul-ConfigList* while maintaining the order among both *ul-ConfigList* and *ul-ConfigListMixed*; the total number of signalled UL non-anchor carriers cannot be more than *maxNonAnchorCarriers-NB-r14*.- If *nprach-Distribution* is absent, the UE supporting mixed operation mode uses the list of UL carriers for random access provided in *ul-ConfigListMixed* and considers *nprach-ProbabiliyAnchor* being set to zero for each NPRACH resource, i.e. the anchor carrier is not used for random access*.*Otherwise, the *nprach-Distribution* field is not applicable and the UE shall ignore the value.For TDD: E-UTRAN configures *ul-ConfigList-r15* and includes the same number of entries as in *dl-ConfigList*. The UL carrier frequency of the non-anchor carrier is same as the DL carrier frequency. |
| ***wus-Config***For FDD: Carrier specific WUS Configuration. |

| Conditional presence | Explanation |
| --- | --- |
| *dl-ConfigList* | This field is optionally present, Need OR, if the field *dl-ConfigList* is present. Otherwise the field is not present. |
| *EDT* | The field is optionally present, Need OR, if *edt-Parameters* in *SystemInformationBlockType2-NB* is present; otherwise the field is not present and the UE shall delete any existing value for this field. |
| *GWUS* | This field is optionally present, Need OR, if g*wus-Config-r16* is present in *SystemInformationBlockType2-NB*. Otherwise the field is not present. |
| *pcch-config* | This field is optionally present, Need OP, if the field *dl-ConfigList* is present and at least one of the carriers in *dl-ConfigList* is configured for paging. Otherwise the field is not present and only the anchor carrier is used for paging. |
| *nprach-config* | This field is mandatory present, if the field *ul-ConfigList* is present and at least one of the carriers in *ul-ConfigList* is configured for random access. Otherwise the field is not present and only the anchor carrier is used for random access. |
| *TDD* | This field is optionally present, Need OR, for TDD. Otherwise the field is not present. |
| *ul-ConfigList* | This field is optionally present, Need OR, if the field *ul-ConfigList* is present. Otherwise the field is not present. |
| *WUS* | This field is mandatory present, if the field *wus-Config* is present in *SystemInformationBlockType2-NB*. Otherwise the field is not present, Need OR. |

|  |
| --- |
| Start of next change |

#### 6.7.3.2 NB-IoT Radio resource control information elements

<Unchanged text omitted >

Editor’s Note: NPDSCH-Config-NB update needed to implement following agreement:

* 16QAM is configured via dedicated signaling separately for UL and DL.

Editor’s Note: Used information from the RAN1 parameters document R1-2108684 to derive the field names and the corresponding descriptions.

#### – *NPDSCH-Config-NB*

The IE *NPDSCH-ConfigCommon-NB* is used to specify the common NPDSCH configuration. The IE *NPDSCH-ConfigDedicated-NB* is used to specify the UE specific NPDSCH configuration.

*NPDSCH-Config-NB* information element

-- ASN1START

NPDSCH-ConfigCommon-NB-r13 ::= SEQUENCE {

 nrs-Power-r13 INTEGER (-60..50)

}

NPDSCH-ConfigDedicated-NB-r16 ::= SEQUENCE {

 npdsch-MultiTB-Config-r16 NPDSCH-MultiTB-Config-NB-r16 OPTIONAL -- Cond twoHARQ

}

NPDSCH-MultiTB-Config-NB-r16 ::= SEQUENCE {

 multiTB-Config-r16 ENUMERATED {interleaved, nonInterleaved},

 harq-AckBundling-r16 ENUMERATED {true} OPTIONAL -- Cond interleaved

}

NPDSCH-ConfigDedicated-NB-v17xy ::= SEQUENCE {

 dl-16QAM-r17 SEQUENCE {

 npdsch-NRS-Powerratio-r17 TYPE FFS OPTIONAL,

 npdsch-NRS-PowerratioWithCRS-r17 TYPE FFS OPTIONAL

 } OPTIONAL -- Need OR

}

-- ASN1STOP

| *NPDSCH-Config-NB* field descriptions |
| --- |
| ***dl-16QAM***Enables 16QAM for DL, see TS 36.213 [23]. |
| ***multiTB-Config***For FDD: Activation of multiple TBs scheduling in DL, see TS 36.213 [23]. Value *interleaved* indicates that multiple TBs scheduling with interleaved transmission is enabled, value *nonInterleaved* indicates that multiple TBs scheduling without interleaved transmission is enabled. |
| ***harq-AckBundling***For FDD: Activation of HARQ ACK bundling for DL multiple TBs scheduling with interleaved transmission, see TS 36.213 [23]. |
| ***npdsch-NRS-Powerratio***For FDD: The power ratio of NPDSCH EPRE to NRS EPRE in symbols without NRS, see TS 36.213 [23]. |
| ***npdsch-NRS-PowerratioWithCRS***For FDD: The power ratio of NPDSCH EPRE to NRS EPRE in symbols with CRS for inband deployments, see TS 36.213 [23]. |
| ***nrs-Power***Provides the downlink narrowband reference-signal EPRE, see TS 36.213 [23], clause 16.2. The actual value in dBm. |

| Conditional presence | Explanation |
| --- | --- |
| *interleaved* | The field is optionally present, Need OR, if *multiTB-Config* is set to *interleaved*; otherwise the field is not present and the UE shall delete any existing value for this field. |
| *twoHARQ* | The field is optionally present, Need OR, if *twoHARQ-ProcessesConfig* is configured; otherwise the field is not present and the UE shall delete any existing value for this field. |

|  |
| --- |
| Start of next change |

#### 6.7.3.2 NB-IoT Radio resource control information elements

<Unchanged text omitted >

Editor’s Note: NPUSCH-Config-NB update needed to implement following agreement:

* 16QAM is configured via dedicated signaling separately for UL and DL.

Editor’s Note: Used information from the RAN1 parameters document R1-2108684 to derive the field names and the corresponding descriptions.

#### – *NPUSCH-Config-NB*

The IE *NPUSCH-ConfigCommon-NB* is used to specify the common NPUSCH configuration. The IE *NPUSCH-ConfigDedicated-NB* is used to specify the UE specific NPUSCH configuration.

*NPUSCH-Config-NB* information element

-- ASN1START

NPUSCH-ConfigCommon-NB-r13 ::= SEQUENCE {

 ack-NACK-NumRepetitions-Msg4-r13 SEQUENCE (SIZE(1.. maxNPRACH-Resources-NB-r13)) OF

 ACK-NACK-NumRepetitions-NB-r13,

 srs-SubframeConfig-r13 ENUMERATED {

 sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,

 sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15

 } OPTIONAL, -- Need OR

 dmrs-Config-r13 SEQUENCE {

 threeTone-BaseSequence-r13 INTEGER (0..12) OPTIONAL, -- Need OP

 threeTone-CyclicShift-r13 INTEGER (0..2),

 sixTone-BaseSequence-r13 INTEGER (0..14) OPTIONAL, -- Need OP

 sixTone-CyclicShift-r13 INTEGER (0..3),

 twelveTone-BaseSequence-r13 INTEGER (0..30) OPTIONAL -- Need OP

 } OPTIONAL, -- Need OR

 ul-ReferenceSignalsNPUSCH-r13 UL-ReferenceSignalsNPUSCH-NB-r13

}

UL-ReferenceSignalsNPUSCH-NB-r13 ::= SEQUENCE {

 groupHoppingEnabled-r13 BOOLEAN,

 groupAssignmentNPUSCH-r13 INTEGER (0..29)

}

NPUSCH-ConfigDedicated-NB-r13 ::= SEQUENCE {

 ack-NACK-NumRepetitions-r13 ACK-NACK-NumRepetitions-NB-r13 OPTIONAL, -- Need ON

 npusch-AllSymbols-r13 BOOLEAN OPTIONAL, -- Cond SRS

 groupHoppingDisabled-r13 ENUMERATED {true} OPTIONAL -- Need OR

}

NPUSCH-ConfigDedicated-NB-v1610 ::= SEQUENCE {

 npusch-MultiTB-Config-r16 ENUMERATED {interleaved, nonInterleaved}

}

NPUSCH-ConfigDedicated-NB-v17xy ::= SEQUENCE {

 ul-16QAM-r17 ENUMERATED {true} OPTIONAL -- Need OR

}

ACK-NACK-NumRepetitions-NB-r13 ::= ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128}

-- ASN1STOP

| *NPUSCH-Config-NB* field descriptions |
| --- |
| ***ack-NACK-NumRepetitions***Number of repetitions for the ACK NACK resource unit carrying HARQ response to NPDSCH, see TS 36.213 [23], clause 16.4.2. If this field is absentand no value was configured via dedicated signalling, the value used for reception of Msg4 is used. |
| ***Ack-NACK-NumRepetitions-Msg4***Number of repetitions for ACK/NACK HARQ response to NPDSCH containing Msg4 per NPRACH resource, see TS 36.213 [23], clause 16.4.2. |
| ***ul-16QAM***Enalbes 16QAM for UL, see TS 36.213 [23]. |
| ***groupAssignmentNPUSCH***See TS 36.211 [21], clause 10.1.4.1.3. |
| ***groupHoppingDisabled***See TS 36.211 [21], clause 10.1.4.1.3. |
| ***groupHoppingEnabled***See TS 36.211 [21], clause 10.1.4.1.3. |
| ***npusch-AllSymbols***If set to TRUE, the UE shall use all NB-IoT symbols for NPUSCH transmission. If set to FALSE, the UE punctures the NPUSCH transmissions in the symbols that collides with SRS. If the field is not present, the UE uses all NB-IoT symbols for NPUSCH transmission. See TS 36.211 [21], clause 10.1.3.6. |
| ***npusch-MultiTB-Config***For FDD: Activation of multiple TBs scheduling in UL, see TS 36.213 [23]. Value *interleaved* indicates that multiple TBs scheduling with interleaved transmission is enabled, value *nonInterleaved* indicates that multiple TBs scheduling without interleaved transmission is enabled. |
| ***sixTone-BaseSequence***The base sequence of DMRS sequence in a cell for 6 tones transmission; see TS 36.211 [21], clause 10.1.4.1.2. If absent, it is given by NB-IoT CellID mod 14. Value 14 is not used. |
| ***sixTone-CyclicShift***Define 4 cyclic shifts for the 6-tone case, see TS 36.211 [21], clause 10.1.4.1.2. |
| ***srs-SubframeConfig***SRS SubframeConfiguration. See TS 36.211 [21], table 5.5.3.3-1. Value sc0 corresponds to value 0, sc1 to value 1 and so on. |
| ***threeTone-BaseSequence***The base sequence of DMRS sequence in a cell for 3 tones transmission; see TS 36.211 [21], clause 10.1.4.1.2. If absent, it is given by NB-IoT CellID mod 12. Value 12 is not used. |
| ***threeTone-CyclicShift***Define 3 cyclic shifts for the 3-tone case, see TS 36.211 [21], clause 10.1.4.1.2. |
| ***twelveTone-BaseSequence***The base sequence of DMRS sequence in a cell for 12 tones transmission; see TS 36.211 [21], clause 10.1.4.1.2. If absent, it is given by NB-IoT CellID mod 30. Value 30 is not used. |
| ***ul-ReferenceSignalsNPUSCH***Used to specify parameters needed for the transmission on NPUSCH. |

| Conditional presence | Explanation |
| --- | --- |
| *SRS* | This field is optionally present, need OP, if *srs-SubframeConfig* is broadcasted.Otherwise, the IE is not present. |

|  |
| --- |
| Start of next change |

#### 6.7.3.2 NB-IoT Radio resource control information elements

<Unchanged text omitted >

Editor’s Note: PhysicalConfigDedicated-NB update needed to implement following agreement:

* 16QAM is configured via dedicated signaling separately for UL and DL.

Editor’s Note: Further parameters may also be needed for 16QAM

#### – *PhysicalConfigDedicated-NB*

The IE *PhysicalConfigDedicated-NB* is used to specify the UE specific physical channel configuration.

*PhysicalConfigDedicated-NB* information element

-- ASN1START

PhysicalConfigDedicated-NB-r13 ::= SEQUENCE {

 carrierConfigDedicated-r13 CarrierConfigDedicated-NB-r13 OPTIONAL, -- Need ON

 npdcch-ConfigDedicated-r13 NPDCCH-ConfigDedicated-NB-r13 OPTIONAL, -- Need ON

 npusch-ConfigDedicated-r13 NPUSCH-ConfigDedicated-NB-r13 OPTIONAL, -- Need ON

 uplinkPowerControlDedicated-r13 UplinkPowerControlDedicated-NB-r13 OPTIONAL, -- Need ON

 ...,

 [[ twoHARQ-ProcessesConfig-r14 ENUMERATED {true} OPTIONAL -- Need OR

 ]],

 [[ interferenceRandomisationConfig-r14 ENUMERATED {true} OPTIONAL -- Need OR

 ]],

 [[ npdcch-ConfigDedicated-v1530 NPDCCH-ConfigDedicated-NB-v1530 OPTIONAL -- Cond TDD

 ]],

 [[ additionalTxSIB1-Config-v1540 ENUMERATED {true} OPTIONAL -- Cond additionalSIB1

 ]],

 [[ npusch-ConfigDedicated-v1610 NPUSCH-ConfigDedicated-NB-v1610

 OPTIONAL, -- Cond twoHARQ

 npdsch-ConfigDedicated-r16 NPDSCH-ConfigDedicated-NB-r16

 OPTIONAL,

 resourceReservationConfigDL-r16 SetupRelease {ResourceReservationConfig-NB-r16}

 OPTIONAL, -- Cond dl-NonAnchor

 resourceReservationConfigUL-r16 SetupRelease {ResourceReservationConfig-NB-r16}

 OPTIONAL -- Cond ul-NonAnchor

 ]],

 [[ npusch-ConfigDedicated-v17xy NPUSCH-ConfigDedicated-NB-v17xy OPTIONAL, -- Need ON

 npdsch-ConfigDedicated-v17xy NPDSCH-ConfigDedicated-NB-v17xy OPTIONAL -- Need ON

 ]]

}

-- ASN1STOP

| *PhysicalConfigDedicated-NB* field descriptions |
| --- |
| ***carrierConfigDedicated***Anchor/ non-anchor carrier used for all unicast transmissions. |
| ***interferenceRandomisationConfig***For FDD: Interference randomisation enabled in connected mode, except for random access procedure in connected mode, see TS 36.211 [21]. For random access in connected mode interference randomisation on non-anchor is used and is not used on anchor carrier, see TS 36.211 [21].For TDD: the parameter is not present. |
| *npdcch-ConfigDedicated*NPDCCH configuration. |
| ***npusch-ConfigDedicated***UL unicast configuration. |
| ***resourceReservationConfigDL***Configuration of downlink reserved resources, e.g. for NB-IoT co-existence with NR, see TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23]. |
| ***resourceReservationConfigUL***Configuration of uplink reserved resources, e.g. for NB-IoT co-existence with NR, see TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23]. |
| ***twoHARQ-ProcessesConfig***Activation of two HARQ processes, see TS 36.212 [22] and TS 36.213 [23]. |
| ***uplink-PowerControlDedicated***UL power control parameter. |
| ***additionalTxSIB1-Config***Indicates if subframe #3 not containing additional SIB1 transmission is a NB-IoT DL subframe, as specified in TS 36.213 [23], clause 16.4. |

| Conditional presence | Explanation |
| --- | --- |
| *additionalSIB1* | This field is optionally present, Need OR, if *additionalTransmissionSIB1* is set to TRUE in *MasterInformationBlock-NB*; otherwise it is not present. |
| *dl-NonAnchor* | The field is optionally present, Need ON, for a DL non-anchor carrier; otherwise the field is not present and the UE shall delete any existing value for this field. |
| *TDD* | The field is optionally present, Need OR, for TDD; otherwise the field is not present and the UE shall delete any existing value for this field. |
| *twoHARQ* | The field is optionally present, Need OR, if *twoHARQ-ProcessesConfig* is configured; otherwise the field is not present and the UE shall delete any existing value for this field. |
| *ul-NonAnchor* | The field is optionally present, Need ON, for an UL non-anchor carrier; otherwise the field is not present and the UE shall delete any existing value for this field. |

Editor’s Note: PUR-Config-NB update needed to implement following agreement:

* A NPUSCH 16QAM activation indication is needed in PUR configuration.

Editor’s Note: Used information from the RAN1 parameters document R1-2108684 to derive the field names and the corresponding descriptions.

#### – *PUR-Config-NB*

The IE *PUR-Config-NB* is used to specify PUR configuration.

*PUR-Config-NB* information element

-- ASN1START

PUR-Config-NB-r16 ::= SEQUENCE {

 pur-ConfigID-r16 PUR-ConfigID-NB-r16 OPTIONAL, --Need OR

 pur-TimeAlignmentTimer-r16 INTEGER (1..8) OPTIONAL, --Need OR

 pur-NRSRP-ChangeThreshold-r16 SetupRelease {PUR-NRSRP-ChangeThreshold-r16}

 OPTIONAL, --Need ON

 pur-ImplicitReleaseAfter-r16 ENUMERATED {n2, n4, n8, spare} OPTIONAL, --Need OR

 pur-RNTI-r16 C-RNTI OPTIONAL, --Need ON

 pur-ResponseWindowTimer-r16 ENUMERATED {pp1, pp2, pp3, pp4, pp8, pp16, pp32, pp64}

 OPTIONAL, --Need ON

 pur-StartTimeParameters-r16 SEQUENCE {

 periodicityAndOffset-r16 PUR-PeriodicityAndOffset-NB-r16,

 startSFN-r16 INTEGER (0..1023),

 startSubframe-r16 INTEGER (0..9),

 hsfn-LSB-Info-r16 BIT STRING (SIZE(1))

 } OPTIONAL, --Need ON

 pur-NumOccasions-r16 ENUMERATED {one, infinite},

 pur-PhysicalConfig-r16 SEQUENCE {

 carrierConfig-r16 CarrierConfigDedicated-NB-r13,

 npusch-NumRUsIndex-r16 INTEGER (0..7),

 npusch-NumRepetitionsIndex-r16 INTEGER (0..7),

 npusch-SubCarrierSetIndex-r16 CHOICE {

 khz15 INTEGER (0..18),

 khz3dot75 INTEGER (0..47)

 },

 npusch-MCS-r16 CHOICE {

 singleTone INTEGER (0..10),

 multiTone INTEGER (0..13)

 },

 p0-UE-NPUSCH-r16 INTEGER (-8..7),

 alpha-r16 ENUMERATED {al0, al04, al05, al06,

 al07, al08, al09, al1},

 npusch-CyclicShift-r16 ENUMERATED {n0, n6},

 npdcch-Config-r16 NPDCCH-ConfigDedicated-NB-r13

 } OPTIONAL, -- Need ON

 ...,

 [[

 pur-PhysicalConfig-v1650 SEQUENCE {

 ack-NACK-NumRepetitions-r16 ACK-NACK-NumRepetitions-NB-r13

 } OPTIONAL --Need ON

 ]],

 [[

 pur-UL-16QAM-Config-r17 SetupRelease {PUR-UL-16QAM-Config-r17} OPTIONAL -- Need ON

 ]]

}

PUR-NRSRP-ChangeThreshold-r16 ::= SEQUENCE {

 increaseThresh-r16 NRSRP-ChangeThresh-NB-r16,

 decreaseThresh-r16 NRSRP-ChangeThresh-NB-r16 OPTIONAL --Need OP

}

PUR-UL-16QAM-Config-r17 ::= SEQUENCE {

 npusch-MCS-r17 INTEGER (14..21) OPTIONAL -- Need OR

}

NRSRP-ChangeThresh-NB-r16 ::= ENUMERATED {dB4, dB6, dB8, dB10, dB14, dB18, dB22, dB26, dB30, dB34, spare6, spare5, spare4, spare3, spare2, spare1}

-- ASN1STOP

| *PUR-Config-NB* field descriptions |
| --- |
| ***ack-NACK-NumRepetitions***Number of repetitions for the ACK NACK resource unit carrying HARQ response to NPDSCH, see TS 36.213 [23], clause 16.4.2. If this field is absent and no value was configured via *pur-Config*, the value of *ack-NACK-NumRepetitions* used for HARQ response to NPDSCH containing this *RRCConnectionRelease-NB* message applies. |
| ***alpha***Parameter: *αc*(3). See TS 36.213 [23], clause 16.2.1.1.1. |
| ***carrierConfig***Carrier used for PUR. |
| ***hsfn-LSB-Info***LSB of the H-SFN corresponding to the last subframe of the first transmission of *RRCConnectionRelease* message containing *pur-Config*. |
| ***npdcch-Config***NPDCCH configuration for PUR. |
| ***npusch-CyclicShift***Parameter: $n\_{cs}$. See TS 36.211 [21], clause 10.1.4.1.2. Value *n0* corresponds to value 0 and value *n6* corresponds to value 6. |
| ***npusch-MCS***Index to tables specified in TS 36.213 [23], Table 16.5.1.2-1 and Table 16.5.1.2-2 for single tone and multi tone respectively, that defines modulation and TBS index for NPUSCH for PUR. |
| ***npusch-NumRepetitionsIndex***Index to a table specified in TS 36.213 [23], Table 16.5.1.1-3, that defines number of repetitions for NPUSCH for PUR. |
| ***npusch-NumRUsIndex***Index to a table specified in TS 36.213 [23], Table 16.5.1.1-2, that defines number of resource units for NPUSCH for PUR. |
| ***npusch-SubCarrierSetIndex***For NPUSCH transmission with subcarrier spacing 3.75 kHz, indicates the subcarrier used for PUR specified in TS 36.213 [23].For NPUSCH transmission with subcarrier spacing 15 kHz, index to a table specified in TS 36.213 [23], Table 16.5.1.1-1, that defines the set of subcarriers for NPUSCH for PUR. |
| ***p0-UE-NPUSCH***Parameter: . See TS 36.213 [23], clause 16.2.1.1.1, unit dB.  |
| ***pur-ImplicitReleaseAfter***Number of consecutive PUR occasions that can be skipped before implicit release of PUR configuration. Value *n2* corresponds to 2 PUR occasions, value *n4* corresponds to 4 PUR occasions, and so on. |
| ***pur-NRSRP-ChangeThreshold***Threshold(s) of change in serving cell NRSRP in dB for TA validation. Value *dB4* corresponds to 4 dB, value *dB6* corresponds to 6 dB, and so on. When *pur-NRSRP-ChangeThreshold* is set to *setup*, if *decreaseThrsh* is absent the value of *increaseThresh* is also used for *decreaseThresh*. |
| ***pur-NumOccasions***Number of PUR occasions. Value *one* corresponds to 1 PUR occasion, and value *infinite* corresponds to an infinite number of PUR occasions. |
| ***pur-PeriodicityAndOffset***Indicates the periodicity for the PUR occasions and time offset until the first PUR occasion. |
| ***pur-ResponseWindowTimer***Duration of the PUR response window in TS 36.321 [6]. Value in PDCCH periods. Value *pp2* corresponds to 2 PDDCH periods, *pp3* corresponds to 3 PDCCH periods, and so on.The value considered by the UE is: *pur-ResponseWindowSize* = Min (signaled value x PDCCH period, 10.24s). |
| ***pur-TimeAlignmentTimer***Value of the time alignment timer for PUR. Value in number of periodicity of PUR. |

|  |
| --- |
| Start of next change |

#### 6.7.3.6 NB-IoT Other information elements

<Unchanged text omitted >

Editor’s Note: UE-Capability-NB will be updated to include implement following agreements:

* The solution is optional
* Support for connected mode measurement is optional with capability signalling.
* Working assumption: Support of 16-QAM has separate UE capabilities for DL and UL
* Confirm the working assumption: The support of 16-QAM uses separate UE capabilities for DL and UL.

#### – *UE-Capability-NB*

The IE *UE-Capability-NB* is used to convey the NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5]. The IE *UE-Capability-NB* is transferred in NB-IoT only.

*UE-Capability-NB* information element

-- ASN1START

UE-Capability-NB-r13 ::= SEQUENCE {

 accessStratumRelease-r13 AccessStratumRelease-NB-r13,

 ue-Category-NB-r13 ENUMERATED {nb1} OPTIONAL,

 multipleDRB-r13 ENUMERATED {supported} OPTIONAL,

 pdcp-Parameters-r13 PDCP-Parameters-NB-r13 OPTIONAL,

 phyLayerParameters-r13 PhyLayerParameters-NB-r13,

 rf-Parameters-r13 RF-Parameters-NB-r13,

 dummy SEQUENCE {} OPTIONAL

}

UE-Capability-NB-Ext-r14-IEs ::= SEQUENCE {

 ue-Category-NB-r14 ENUMERATED {nb2} OPTIONAL,

 mac-Parameters-r14 MAC-Parameters-NB-r14 OPTIONAL,

 phyLayerParameters-v1430 PhyLayerParameters-NB-v1430 OPTIONAL,

 rf-Parameters-v1430 RF-Parameters-NB-v1430,

 nonCriticalExtension UE-Capability-NB-v1440-IEs OPTIONAL

}

UE-Capability-NB-v1440-IEs ::= SEQUENCE {

 phyLayerParameters-v1440 PhyLayerParameters-NB-v1440 OPTIONAL,

 nonCriticalExtension UE-Capability-NB-v14x0-IEs OPTIONAL

}

UE-Capability-NB-v14x0-IEs ::= SEQUENCE {

-- Following field is only to be used for late REL-14 extensions

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-Capability-NB-v1530-IEs OPTIONAL

}

UE-Capability-NB-v1530-IEs ::= SEQUENCE {

 earlyData-UP-r15 ENUMERATED {supported} OPTIONAL,

 rlc-Parameters-r15 RLC-Parameters-NB-r15,

 mac-Parameters-v1530 MAC-Parameters-NB-v1530,

 phyLayerParameters-v1530 PhyLayerParameters-NB-v1530 OPTIONAL,

 tdd-UE-Capability-r15 TDD-UE-Capability-NB-r15 OPTIONAL,

 nonCriticalExtension UE-Capability-NB-v15x0-IEs OPTIONAL

}

UE-Capability-NB-v15x0-IEs ::= SEQUENCE {

-- Following field is only to be used for late REL-15 extensions

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-Capability-NB-v1610-IEs OPTIONAL

}

UE-Capability-NB-v1610-IEs ::= SEQUENCE {

 earlySecurityReactivation-r16 ENUMERATED {supported} OPTIONAL,

 earlyData-UP-5GC-r16 ENUMERATED {supported} OPTIONAL,

 pur-Parameters-r16 PUR-Parameters-NB-r16 OPTIONAL,

 mac-Parameters-v1610 MAC-Parameters-NB-v1610,

 phyLayerParameters-v1610 PhyLayerParameters-NB-v1610 OPTIONAL,

 son-Parameters-r16 SON-Parameters-NB-r16 OPTIONAL,

 meas-Parameters-r16 Meas-Parameters-NB-r16,

 tdd-UE-Capability-v1610 TDD-UE-Capability-NB-v1610 OPTIONAL,

 nonCriticalExtension UE-Capability-NB-v16x0-IEs OPTIONAL

}

UE-Capability-NB-v16x0-IEs ::= SEQUENCE {

-- Following field is only to be used for late REL-16 extensions

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-Capability-NB-v17xy-IEs OPTIONAL

}

UE-Capability-NB-v17xy-IEs ::= SEQUENCE {

 connectedModeMeasurements-NB-r17 ENUMERATED {supported} OPTIONAL,

 dl-16QAM-NB-r17 ENUMERATED {supported} OPTIONAL,

 ul-16QAM-NB-r17 ENUMERATED {supported} OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

TDD-UE-Capability-NB-r15 ::= SEQUENCE {

 ue-Category-NB-r15 ENUMERATED {nb2} OPTIONAL,

 phyLayerParametersRel13-r15 PhyLayerParameters-NB-r13 OPTIONAL,

 phyLayerParametersRel14-r15 PhyLayerParameters-NB-v1430 OPTIONAL,

 phyLayerParameters-v1530 PhyLayerParameters-NB-v1530 OPTIONAL,

 ...

}

TDD-UE-Capability-NB-v1610 ::= SEQUENCE {

 slotSymbolResourceResvDL-r16 ENUMERATED {supported} OPTIONAL,

 slotSymbolResourceResvUL-r16 ENUMERATED {supported} OPTIONAL,

 subframeResourceResvDL-r16 ENUMERATED {supported} OPTIONAL,

 subframeResourceResvUL-r16 ENUMERATED {supported} OPTIONAL

}

AccessStratumRelease-NB-r13 ::= ENUMERATED {rel13, rel14, rel15, rel16, spare4, spare3, spare2, spare1, ...}

PDCP-Parameters-NB-r13 ::= SEQUENCE {

 supportedROHC-Profiles-r13 SEQUENCE {

 profile0x0002 BOOLEAN,

 profile0x0003 BOOLEAN,

 profile0x0004 BOOLEAN,

 profile0x0006 BOOLEAN,

 profile0x0102 BOOLEAN,

 profile0x0103 BOOLEAN,

 profile0x0104 BOOLEAN

 },

 maxNumberROHC-ContextSessions-r13 ENUMERATED {cs2, cs4, cs8, cs12} DEFAULT cs2,

 ...

}

RLC-Parameters-NB-r15 ::= SEQUENCE {

 rlc-UM-r15 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-NB-r14 ::= SEQUENCE {

 dataInactMon-r14 ENUMERATED {supported} OPTIONAL,

 rai-Support-r14 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-NB-v1530 ::= SEQUENCE {

 sr-SPS-BSR-r15 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-NB-v1610 ::= SEQUENCE {

 rai-SupportEnh-r16 ENUMERATED {supported} OPTIONAL

}

Meas-Parameters-NB-r16 ::= SEQUENCE {

 dl-ChannelQualityReporting-r16 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-NB-r13 ::= SEQUENCE {

 multiTone-r13 ENUMERATED {supported} OPTIONAL,

 multiCarrier-r13 ENUMERATED {supported} OPTIONAL

 }

PhyLayerParameters-NB-v1430 ::= SEQUENCE {

 multiCarrier-NPRACH-r14 ENUMERATED {supported} OPTIONAL,

 twoHARQ-Processes-r14 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-NB-v1440 ::= SEQUENCE {

 interferenceRandomisation-r14 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-NB-v1530 ::= SEQUENCE {

 mixedOperationMode-r15 ENUMERATED {supported} OPTIONAL,

 sr-WithHARQ-ACK-r15 ENUMERATED {supported} OPTIONAL,

 sr-WithoutHARQ-ACK-r15 ENUMERATED {supported} OPTIONAL,

 nprach-Format2-r15 ENUMERATED {supported} OPTIONAL,

 additionalTransmissionSIB1-r15 ENUMERATED {supported} OPTIONAL,

 npusch-3dot75kHz-SCS-TDD-r15 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-NB-v1610 ::= SEQUENCE {

 npdsch-MultiTB-r16 ENUMERATED {supported} OPTIONAL,

 npdsch-MultiTB-Interleaving-r16 ENUMERATED {supported} OPTIONAL,

 npusch-MultiTB-r16 ENUMERATED {supported} OPTIONAL,

 npusch-MultiTB-Interleaving-r16 ENUMERATED {supported} OPTIONAL,

 multiTB-HARQ-AckBundling-r16 ENUMERATED {supported} OPTIONAL,

 slotSymbolResourceResvDL-r16 ENUMERATED {supported} OPTIONAL,

 slotSymbolResourceResvUL-r16 ENUMERATED {supported} OPTIONAL,

 subframeResourceResvDL-r16 ENUMERATED {supported} OPTIONAL,

 subframeResourceResvUL-r16 ENUMERATED {supported} OPTIONAL

}

PUR-Parameters-NB-r16 ::= SEQUENCE {

 pur-CP-EPC-r16 ENUMERATED {supported} OPTIONAL,

 pur-CP-5GC-r16 ENUMERATED {supported} OPTIONAL,

 pur-UP-EPC-r16 ENUMERATED {supported} OPTIONAL,

 pur-UP-5GC-r16 ENUMERATED {supported} OPTIONAL,

 pur-NRSRP-Validation-r16 ENUMERATED {supported} OPTIONAL,

 pur-CP-L1Ack-r16 ENUMERATED {supported} OPTIONAL

}

RF-Parameters-NB-r13 ::= SEQUENCE {

 supportedBandList-r13 SupportedBandList-NB-r13,

 multiNS-Pmax-r13 ENUMERATED {supported} OPTIONAL

}

RF-Parameters-NB-v1430 ::= SEQUENCE {

 powerClassNB-14dBm-r14 ENUMERATED {supported} OPTIONAL

}

SupportedBandList-NB-r13 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBand-NB-r13

SupportedBand-NB-r13 ::= SEQUENCE {

 band-r13 FreqBandIndicator-NB-r13,

 powerClassNB-20dBm-r13 ENUMERATED {supported} OPTIONAL

}

SON-Parameters-NB-r16 ::= SEQUENCE {

 anr-Report-r16 ENUMERATED {supported} OPTIONAL,

 rach-Report-r16 ENUMERATED {supported} OPTIONAL

}

-- ASN1STOP

| *UE-Capability-NB* field descriptions | *FDD/TDD appl* | *FDD/TDD diff* |
| --- | --- | --- |
| ***accessStratumRelease***Set to rel16 in this version of the specification. | FDD/TDD | No |
| ***additionalTransmissionSIB1***Indicates whether the UE supports additional SIB1 transmission as specified in TS 36.213 [23]. | FDD | - |
| ***anr-Report***Indicates whether the UE supports ANR measurements in RRC\_IDLE. | FDD/TDD | No |
| ***connectedModeMeasurements***Indicates whether the UE in RRC\_CONNECTED supports neighbour cell measurements as defined in TS 36.304 [4].Editor’s Note: FFS whether this is applicable to only FDD, only TDD or both FDD & TDD. If applicable to both then whehter FDD/TDD differentiation required. | TBD | TBD |
| ***dataInactMon***Indicates whether the UE supports the data inactivity monitoring as specified in TS 36.321 [6]. | FDD/TDD | No |
| ***dl-16QAM***Indicates whether the UE supports 16QAM for unicast as defined in TS 36.xxx [x].Editor’s Note: FFS whether this is applicable to only FDD, only TDD or both FDD & TDD. If applicable to both then whehter FDD/TDD differentiation required. | TBD | TBD |
| ***dl-ChannelQualityReporting-r16***Indicates whether the UE supports DL channel quality reporting in connected mode as specified in TS 36.321 [6]. | FDD | - |
| ***dummy***This field is not used in the specification. It shall not be sent by the UE. | NA | NA |
| ***earlyData-UP, earlyData-UP-5GC***Indicates whether the UE supports EDT for User plane CIoT EPS/5GS optimisations, as defined in TS 24.301 [35] and 24.501 [95] respectively. | FDD | - |
| ***earlySecurityReactivation***Indicates whether the UE supports early security reactivation when resuming a suspended RRC connection. | FDD/TDD | No |
| ***interferenceRandomisation***For FDD: Indicates whether the UE supports interference randomisation in connected mode as defined in TS.36.211 [21]. | FDD | - |
| ***maxNumberROHC-ContextSessions***Set to the maximum number of concurrently active ROHC contexts supported by the UE, excluding context sessions that leave all headers uncompressed. cs2 corresponds with 2 (context sessions), cs4 corresponds with 4 and so on. The network ignores this field if the UE supports none of the ROHC profiles in *supportedROHC-Profiles*. | FDD/TDD | No |
| ***mixedOperationMode***Defines whether the UE supports multi-carrier operation with mixed operation mode, standalone or inband/guardband, between the anchor carrier and the non-anchor carrier for unicast, paging, and random access as specified in TS 36.300 [9]. | FDD | - |
| ***multiCarrier***Defines whether the UE supports multi -carrier operation. | FDD/TDD | Yes |
| ***multicarrier-NPRACH***Defines whether the UE supports NPRACH on non-anchor carrier as specified in TS 36.321 [6]. | FDD/TDD | Yes |
| ***multipleDRB***Defines whether the UE supports multiple DRBs. | FDD/TDD | No |
| ***multiNS-Pmax***Defines whether the UE supports the mechanisms defined for NB-IoT cells broadcasting *NS-PmaxList-NB*. | FDD/TDD | No |
| ***multiTB-HARQ-AckBundling***Indicates whether the UE supports HARQ ACK bundling for interleaved transmission for DL.If *multiTB-HARQ-AckBundling* is included, the UE shall also indicate support for *npdsch-MultiTB-Interleaving*. | FDD | - |
| ***multiTone***Defines whether the UE supports UL multi-tone transmissions on NPUSCH. | FDD/TDD | Yes |
| ***npdsch-MultiTB***Indicates whether the UE supports multiple TBs scheduling in RRC\_CONNECTED for DL.If *npdsch-MultiTB* is included, the UE shall also indicate support for *twoHARQ-Processes*. | FDD | - |
| ***npdsch-MultiTB-Interleaving***Indicates whether the UE supports interleaved transmission when multiple TBs is scheduled in RRC\_CONNECTED for DL. | FDD | - |
| ***nprach-Format2***Defines whether the UE supports NPRACH resources using preamble format 2. | FDD | - |
| ***npusch-3dot75kHz-SCS-TDD***Indicates whether the UE supports NPUSCH with 3.75kHz SCS for TDD. | TDD | - |
| ***npusch-MultiTB***Indicates whether the UE supports multiple TBs scheduling in RRC\_CONNECTED for UL.If *npusch-MultiTB* is included, the UE shall also indicate support for *twoHARQ-Processes*. | FDD | - |
| ***npusch-MultiTB-Interleaving***Indicates whether the UE supports interleaved transmission when multiple TBs is scheduled in RRC\_CONNECTED for UL. | FDD | - |
| ***powerClassNB-14dBm***Defines whether the UE supports power class 14dBm in all the bands supported by the UE as specified in TS 36.101 [42].If *powerClassNB-20dBm* is included, the UE shall not include the field *powerClassNB-14dBm*. | FDD/TDD | No |
| ***powerClassNB-20dBm***Defines whether the UE supports power class 20dBm in NB-IoT for the band, as specified in TS 36.101 [42]. If neither *powerClassNB-14dBm* nor *powerClassNB-20dBm* is included, UE supports power class 23 dBm in the NB-IoT band. | FDD/TDD | No |
| ***pur-CP-EPC*, *pur-CP-5GC***Indicates whether the UE supports transmission using PUR for Control plane CIoT EPS/5GS optimisations, as defined in TS 24.301 [35] and TS 24.501 [95] respectively. | FDD | - |
| ***pur-CP-L1Ack***Indicates whether UE supports L1 acknowledgement in response to CP transmission using PUR.If *pur-CP-L1Ack* is included, the UE shall also indicate support for *pur-CP-EPC* or *pur-CP-5GC*. | FDD | - |
| ***pur-NRSRP-Validation***Indicates whether UE supports serving cell NRSRP for TA validation for transmission using PUR.If *pur-NRSRP-Validation* is included, the UE shall also indicate support for *pur-CP-EPC*, *pur-CP-5GC*, *pur-UP-EPC* or *pur-CP-5GC*. | FDD | - |
| ***pur-UP-EPC*, *pur-UP-5GC***Indicates whether the UE supports transmission using PUR for User plane CIoT EPS/5GS optimisations, as defined in TS 24.301 [35] and TS 24.501 [95] repectively. | FDD | - |
| ***rach-Report***Indicates whether the UE supports delivery of *rach-Report*. | FDD/TDD | No |
| ***rai-Support***Defines whether the UE supports release assistance indication (RAI) as specified in TS 36.321 [6]. | FDD/TDD | No |
| ***rai-SupportEnh***Indicates whether the UE supports AS Release Assistance Indication via the DCQR and AS RAI MAC CE when connected to EPC as specified in TS 36.321 [6]. | FDD/TDD | No |
| ***rlc-UM***Defines whether the UE supports RLC UM as specified in TS 36.322 [7]. | FDD/TDD | No |
| ***slotSymbolResourceResvDL***Indicates whether the UE supports slot/symbol-level time-domain DL resource reservation, e.g. for NB-IoT coexistence with NR.If *slotSymbolResourceResvDL* is included, the UE shall also indicate support for *subframeResourceResvDL*. | FDD/TDD | Yes |
| ***slotSymbolResourceResvUL***Indicates whether the UE supports slot/symbol-level time-domain UL resource reservation, e.g. for NB-IoT coexistence with NR.If *slotSymbolResourceResvUL* is included, the UE shall also indicate support for *subframeResourceResvUL*. | FDD/TDD | Yes |
| ***supportedBandList***Includes the supported NB-IoT bands as defined in TS 36.101 [42]. | FDD/TDD | No |
| ***sr-SPS-BSR*** Defines whether the UE supports SR using SPS BSR as specified in TS 36.321 [6]. | FDD | - |
| ***sr-withHARQ-ACK*** Defines whether the UE supports physical layer SR with HARQ ACK as specified in TS 36.213 [23]. | FDD | - |
| ***sr-withoutHARQ-ACK*** Defines whether the UE supports physical layer SR without HARQ ACK as specified in TS 36.211 [21] and TS 36.213 [23]. | FDD | - |
| ***subframeResourceResvDL***Indicates whether the UE supports subframe-level time-domain DL resource reservation, e.g. for NB-IoT coexistence with NR. | FDD/TDD | Yes |
| ***subframeResourceResvUL***Indicates whether the UE supports subframe-level time-domain UL resource reservation, e.g. for NB-IoT coexistence with NR. | FDD/TDD | Yes |
| ***supportedROHC-Profiles***List of supported ROHC profiles as defined in TS 36.323 [8]. | FDD/TDD | No |
| ***twoHARQ-Processes***Defines whether the UE supports two HARQ processes operation in DL and UL as specified in TS 36.212 [22] and TS 36.213 [23]. | FDD/TDD | Yes |
| ***ue-Category-NB***UE category as defined in TS 36.306 [5]. Value nb1 corresponds to UE category NB1, value nb2 corresponds to UE category NB2.A UE shall always include the field *ue-Category-NB-r13* in this version of the specification. | FDD/TDD | Yes |
| ***ul-16QAM***Indicates whether the UE supports 16QAM for unicast as defined in TS 36.xxx [x].Editor’s Note: FFS whether this is applicable to only FDD, only TDD or both FDD & TDD. If applicable to both then whehter FDD/TDD differentiation required. | TBD | TBD |

NOTE 1: The IE *UE-Capability-NB* does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently AS need not provide "man-in-the-middle" protection for the security capabilities.

NOTE 2: The column 'FDD/TDD appl' indicates the applicability to the xDD mode: 'FDD' means applicable to FDD only, 'TDD' means applicable to TDD only and 'FDD/TDD' means applicable to FDD and TDD.

NOTE 3: The column 'FDD/TDD diff' indicates if the UE is allowed to signal a different value for FDD and TDD when the capability applies to both FDD and TDD modes. '-' is used when the capability applies to one mode only, 'No' is used for dual mode capabilities where a common value is signalled for both modes, and 'Yes' is used for dual mode capabilities where a separate value is signalled for each mode. Common capabilities and FDD capabilities are reported in the fields of *UE-Capability-NB* except field *tdd-UE-Capability.* TDD capabilities are reported in *tdd-UE-Capability*.

Editor’s Note: UE-RadioPagingInfo-NB will be updated to include implement following agreements:

* UE capability for Rel-17 paging carrier selection should be introduced

#### – *UE-RadioPagingInfo-NB*

The IE *UE-RadioPagingInfo-NB* contains UE NB-IoT capability information needed for paging.

*UE-RadioPagingInfo-NB* information element

-- ASN1START

UE-RadioPagingInfo-NB-r13 ::= SEQUENCE {

 ue-Category-NB-r13 ENUMERATED {nb1} OPTIONAL,

 ...,

 [[ multiCarrierPaging-r14 ENUMERATED {true} OPTIONAL

 ]],

 [[ mixedOperationMode-r15 ENUMERATED {supported} OPTIONAL,

 wakeUpSignal-r15 ENUMERATED {true} OPTIONAL,

 wakeUpSignalMinGap-eDRX-r15 ENUMERATED {ms40, ms240, ms1000, ms2000} OPTIONAL,

 multiCarrierPagingTDD-r15 ENUMERATED {true} OPTIONAL

 ]],

 [[ ue-Category-NB-r16 ENUMERATED {nb2} OPTIONAL,

 groupWakeUpSignal-r16 ENUMERATED {true} OPTIONAL,

 groupWakeUpSignalAlternation-r16 ENUMERATED {true} OPTIONAL

 ]],

 [[ coverageBasedPaging-NB-r17 ENUMERATED {supported} OPTIONAL

 ]]

}

-- ASN1STOP

| *UE-RadioPagingInfo-NB field descriptions* |
| --- |
| ***coverageBasedPaging***Indicates whether the UE in RRC\_IDLE supports coverage based paging carrier selection as defined in TS 36.304 [4]. |
| ***groupWakeUpSignal***Indicates whether the UE in RRC\_IDLE supports GWUS without group resource alternation for paging in DRX in FDD as specified in TS 36.211 [21], TS 36.213 [23] and TS 36.304 [4]. If this field is included, the minimum gap between GWUS and associated PO for DRX is fixed as 40 ms. |
| ***groupWakeUpSignalAlternation***Indicates whether the UE in RRC\_IDLE supports GWUS with group resource alternation for paging in DRX in FDD as specified in TS 36.211 [21], TS 36.213 [23] and TS 36.304 [4]. If this field is included, the minimum gap between GWUS and associated PO for DRX is fixed as 40 ms. |
| ***mixedOperationMode***Indicates whether the UE supports multi-carrier operation with mixed operation mode, standalone or inband/guardband, between the anchor carrier and non-anchor carrier for unicast, paging, and random access, as specified in TS 36.300 [9]. |
| ***multiCarrierPaging***Indicates whether the UE supports paging on non-anchor carriers as defined in TS 36.304 [4]. |
| ***multiCarrierPagingTDD***Indicates whether the UE supports paging on non-anchor carriers for TDD as defined in TS 36.304 [4]. |
| ***ue-Category-NB***UE NB-IoT category as defined in TS 36.306 [5]. Value *nb1* corresponds to UE category NB1, value *nb2* corresponds to UE category NB2.A UE shall always include the field *ue-Category-NB-r13* in this version of the specification. |
| ***wakeUpSignal***Indicates whether the UE supports WUS for paging in DRX in FDD as specified in TS 36.304 [4]. If this field is included, the minimum gap between WUS and associated PO for DRX is fixed as 40 ms. |
| ***wakeUpSignalMinGap-eDRX***Indicates the minimum gap the UE supports between WUS or GWUS and associated PO in case of eDRX in FDD, as specified in TS 36.304 [4]. Value *ms40* corresponds to 40 ms, value *ms240* corresponds to 240 ms and so on.If this field is included, the UE shall also indicate support for WUS or GWUS for paging in DRX. |

|  |
| --- |
| End of changes |