**3GPP TSG-RAN WG2 Meeting #118-e *R2-220xxxx***

**Online, 9 - 20 May, 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **36.331** | **CR** | **4790** | **rev** | **1** | **Current version:** | **16.8.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Minor changes collected by Rapporteur |
|  |  |
| ***Source to WG:*** | Samsung |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NB\_IOTenh3-Core |  | ***Date:*** | 2022-04-25 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-16 |
|  | *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:*** | The changes included in this CR aim to correct minor errors in the specification. |
|  |  |
| ***Summary of change:*** | This CR includes the following change:1. Change the field name of meas-Parameters-r16 and IE name of Meas-Parameters-NB-r16 to measParameters-r16 and MeasParameters-NB-r16, respectively.
2. In RRCConnectionResume-v1610-Ies: Suffix “-r16” is added for the fields restoreMCG-SCells, restoreSCG and nr-SecondaryCellGroupConfig.
3. Suffices “-r16” are removed from the CHOICE structure in FailureInformation-r16 IE and RLF-Report-r9 IE.
4. In 7.3, table of timers are revised using alphabet order.
5. Correct the editorials (e.g. missing comma/space, style changes, etc.)

**Impact analysis**Impacted functionality:None i.e. these minor corrections do not involve any functional changes Inter-operability:No interoperability issue (as no functional change). |
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| ***Consequences if not approved:*** | Miscellaneous non-controversial errors will remain in the specification. |
|  |  |
| ***Clauses affected:*** | 5.5.2.13, 5.6.13a.1, 5.6.3.3, 5.6.8.2, 5.10.7.3, 5.10.8.2, 5.10.8a, 6.2.2, 6.7.3.6, 7.3.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

#### 5.5.2.13 NR measurement timing configuration

The UE shall setup the first SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *periodicityAndOffset* (providing *Periodicity* and *Offset* value for the following condition) in the *MTC-SSB-NR* configuration i.e., the first subframe of each SMTC occasion occurs at an SFN and subframe of the PCell meeting the following condition:

SFN mod *T* = FLOOR(*Offset*/10);

if the *Periodicity* is larger than *sf5*:

subframe = *Offset* mod 10;

else:

subframe = *Offset* or (*Offset* +5);

with *T* = CEIL(*Periodicity*/10).

On the concerned frequency, the UE shall not consider SS/PBCH block transmission in subframes outside the SMTC occasion which lasts for *ssb-Duration* for measurements including RRM measurements except for SFTD measurement (see TS 36.133 [16], clause 8.1.2.4.25.2 and 8.1.2.4.26.1).

If *smtc2-LP* is present, for cells indicated in the *pci-List* parameter in *smtc2-LP* for inter-RAT cell reselection, the UE shall setup an additional SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *periodicity* parameter in the *smtc2-LP* configuration and use the *Offset* (derived from parameter *periodicityAndOffset*) and *ssb-Duration* parameter from the *measTimingConfig* configuration for that frequency. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell or serving cell (for cell reselection) meeting the above condition.

#### 5.6.2.3 Actions related to transmission of *ULInformationTransfer* message

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

1> if there is a need to transfer NAS information:

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

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

2> else:

3> set the *dedicatedInfoType* to include the *dedicatedInfoNAS*;

1> if there is a need to transfer CDMA2000 1XRTT information:

2> set the *dedicatedInfoType* to include the *dedicatedInfoCDMA2000-1XRTT*;

1> if there is a need to transfer CDMA2000 HRPD information:

2> set the *dedicatedInfoType* to include the *dedicatedInfoCDMA2000-HRPD*;

1> upon RRC connection establishment, if UE supports the Control Plane CIoT EPS/5GS optimisation and UE does not need UL gaps during continuous uplink transmission:

2> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for *ULInformationTransfer* message and subsequent uplink transmission in RRC\_CONNECTED except for UL transmissions as specified in TS 36.211 [21];

1> if there is a need to transfer F1-C related information (applies only to IAB-MT):

2> include the *dedicatedInfoF1c*;

1> submit the *ULInformationTransfer* message to lower layers for transmission, upon which the procedure ends;

#### 5.6.3.3 Reception of the *UECapabilityEnquiry* by the UE

The UE shall:

1> for NB-IoT, set the contents of *UECapabilityInformation* message as follows:

2> include the UE Radio Access Capability Parameters within the *ue-Capability*;

2> include *ue-RadioPagingInfo*;

2> submit the *UECapabilityInformation* message to lower layers for transmission, upon which the procedure ends;

1> else, set the contents of *UECapabilityInformation* message as follows:

2> if the *ue-CapabilityRequest* includes *eutra*:

3> include the *UE-EUTRA-Capability* within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *eutra*;

3> if the UE supports FDD and TDD:

4> set all fields of *UECapabilityInformation*, except field *fdd-Add-UE-EUTRA-Capabilities* and *tdd-Add-UE-EUTRA-Capabilities* (including their sub-fields), to include the values applicable for both FDD and TDD (i.e. functionality supported by both modes);

4> if (some of) the UE capability fields have a different value for FDD and TDD:

5> if for FDD, the UE supports additional functionality compared to what is indicated by the previous fields of *UECapabilityInformation*:

6> include field *fdd-Add-UE-EUTRA-Capabilities* and set it to include fields reflecting the additional functionality applicable for FDD;

5> if for TDD, the UE supports additional functionality compared to what is indicated by the previous fields of *UECapabilityInformation*:

6> include field *tdd-Add-UE-EUTRA-Capabilities* and set it to include fields reflecting the additional functionality applicable for TDD;

NOTE 1: The UE includes fields of *XDD-Add-UE-EUTRA-Capabilities* in accordance with the following:

- The field is included only if one or more of its sub-fields (or bits in the feature group indicators string) has a value that is different compared to the value signalled elsewhere within *UE-EUTRA-Capability*;

(this value signalled elsewhere is also referred to as the *Common value*, that is supported for both XDD modes)

- For the fields that are included in *XDD-Add-UE-EUTRA-Capabilities*, the UE sets:

- the sub-fields (or bits in the feature group indicators string) that are not allowed to be different to the same value as the *Common value*;

- the sub-fields (or bits in the feature group indicators string) that are allowed to be different to a value indicating at least the same functionality as indicated by the *Common value*;

3> else (UE supports single xDD mode):

4> set all fields of *UECapabilityInformation*, except field *fdd-Add-UE-EUTRA-Capabilities* and *tdd-Add-UE-EUTRA-Capabilities* (including their sub-fields), to include the values applicable for the xDD mode supported by the UE;

3> compile a list of band combinations, candidate for inclusion in the *UECapabilityInformation* message, comprising of band combinations supported by the UE according to the following priority order (i.e. listed in order of decreasing priority):

4> include all non-CA bands, regardless of whether UE supports carrier aggregation, only:

- if the UE includes *ue-Category-v1020* (i.e. indicating category 6 to 8); or

- if for at least one of the non-CA bands, the UE supports more MIMO layers with TM9 and TM10 than implied by the UE category; or

- if the UE supports TM10 with one or more CSI processes; or

- if the UE supports 1024QAM in DL;

4> if the *UECapabilityEnquiry* message includes *requestedFrequencyBands* and UE supports *requestedFrequencyBands*:

5> include all 2DL+1UL CA band combinations, only consisting of bands included in *requestedFrequencyBands*;

5> include all other CA band combinations, only consisting of bands included in *requestedFrequencyBands*, and prioritized in the order of *requestedFrequencyBands*, (i.e. first include remaining band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on);

4> else (no requested frequency bands):

5> include all 2DL+1UL CA band combinations;

5> include all other CA band combinations;

4> if UE supports *maximumCCsRetrieval* and if the *UECapabilityEnquiry* message includes the *requestedMaxCCsDL* and the *requestedMaxCCsUL* (i.e. both UL and DL maximums are given):

5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the *requestedMaxCCsDL* or for which the number of CCs in UL exceeds the value indicated in the *requestedMaxCCsUL*;

5> indicate in *requestedCCsUL* the same value as received in *requestedMaxCCsUL*;

5> indicate in *requestedCCsDL* the same value as received in *requestedMaxCCsDL*;

4> else if UE supports *maximumCCsRetrieval* and if the *UECapabilityEnquiry* message includes the *requestedMaxCCsDL* (i.e. only DL maximum limit is given):

5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the *requestedMaxCCsDL*;

5> indicate value in *requestedCCsDL* the same value as received in *requestedMaxCCsDL*;

4> else if UE supports *maximumCCsRetrieval* and if the *UECapabilityEnquiry* message includes the *requestedMaxCCsUL* (i.e. only UL maximum limit is given):

5> remove from the list of candidates the band combinations for which the number of CCs in UL exceeds the value indicated in the *requestedMaxCCsUL*;

5> indicate in *requestedCCsUL* the same value as received in *requestedMaxCCsUL;*

4> if the UE supports *reducedIntNonContComb* and the *UECapabilityEnquiry* message includes *requestReducedIntNonContComb*:

5> set *reducedIntNonContCombRequested* to true;

5> remove from the list of candidates the intra-band non-contiguous CA band combinations which support is implied by another intra-band non-contiguous CA band combination included in the list of candidates as specified in TS 36.306 [5], clause 4.3.5.21:

4> if the UE supports *requestReducedFormat* and UE supports *skipFallbackCombinations* and *UECapabilityEnquiry* message includes *requestSkipFallbackComb*:

5> set *skipFallbackCombRequested* to true;

5> for each band combination included in the list of candidates (including 2DL+1UL CA band combinations), starting with the ones with the lowest number of DL and UL carriers, that concerns a fallback band combination of another band combination included in the list of candidates as specified in TS 36.306 [5]:

6> remove the band combination from the list of candidates;

6> include *differentFallbackSupported* in the band combination included in the list of candidates whose fallback concerns the removed band combination, if its capabilities differ from the removed band combination;

4> if the UE supports *requestReducedFormat* and *diffFallbackCombReport*, and *UECapabilityEnquiry* message includes *requestDiffFallbackCombList*:

5> if the UE does not support *skipFallbackCombinations* or *UECapabilityEnquiry* message does not include *requestSkipFallbackComb*:

6> remove all band combination from the list of candidates;

5> for each CA band combination indicated in *requestDiffFallbackCombList*:

6> include the CA band combination, if not already in the list of candidates;

6> include the fallback combinations for which the supported UE capabilities are different from the capability of the CA band combination;

5> include CA band combinations indicated in *requestDiffFallbackCombList* into *requestedDiffFallbackCombList*;

3> if the *UECapabilityEnquiry* message includes *requestReducedFormat* and UE supports *requestReducedFormat*:

4> include in *supportedBandCombinationReduced* as many as possible of the band combinations included in the list of candidates, including the non-CA combinations, determined according to the rules and priority order defined above;

3> else:

4> if the *UECapabilityEnquiry* message includes *requestedFrequencyBands* and UE supports *requestedFrequencyBands*:

5> include in *supportedBandCombination* as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;

5> include in *supportedBandCombinationAdd* as many as possible of the remaining band combinations included in the list of candidates, (i.e. the candidates not included in *supportedBandCombination)*, up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;

4> else:

5> include in *supportedBandCombination* as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules defined above;

5> if it is not possible to include in *supportedBandCombination* all the band combinations to be included according to the above, selection of the subset of band combinations to be included is left up to UE implementation;

3> indicate in *requestedBands* the same bands and in the same order as included in *requestedFrequencyBands*, if received;

3> if the UE is a category 0, M1 or M2 UE, or supports any UE capability information in *ue-RadioPagingInfo,* according to TS 36.306 [5]:

4> include *ue-RadioPagingInfo* and set the fields according to TS 36.306 [5];

3> if the UE supports (NG)EN-DC or NE-DC and if *requestedFreqBandsNR-MRDC* is included in the request:

4> include into *featureSetsEUTRA* the feature sets that are applicable for the received *requestedFreqBandsNR-MRDC* and *requestedCapabilityCommon* as specified in TS 38.331 [82], clause 5.6.1.4.

NOTE 2: The network must include the *requestedFreqBandsNR-MRDC* in order to obtain feature sets for E-UTRA and MR-DC.

NOTE 3: Even if the network requests (only) capabilities for *eutra*, it may include NR band numbers in the *requestedFreqBandsNR-MRDC* in order to ensure that the UE includes all necessary feature sets (i.e. E-UTRA and NR) needed for subsequently requested *eutra-nr* capabilities.

3> if the *UECapabilityEnquiry* message includes *requestSTTI-SPT-Capability* and if the UE supports short TTI and/or SPT (i.e., *sTTI-SPT-Supported*):

4> for each band combination the UE included in a field of the *UECapabilityInformation* message in accordance with the previous:

5> if the UE supports short TTI, include the short TTI capabilities for each of the band combinations using the *stti-SPT-BandParameters*;

5> if the UE supports SPT, include the SPT capabilities for each of the band combinations using the *stti-SPT-BandParameters*;

NOTE 4: The UE may have to add/repeat the band combinations to the list of band combinations included earlier, to include short TTI capabilities and/or SPT capabilities.

2> if the *ue-CapabilityRequest* includes *geran-cs* and if the UE supports GERAN CS domain:

3> include the UE radio access capabilities for GERAN CS within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *geran-cs*;

2> if the *ue-CapabilityRequest* includes *geran-ps* and if the UE supports GERAN PS domain:

3> include the UE radio access capabilities for GERAN PS within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *geran-ps*;

2> if the *ue-CapabilityRequest* includes *utra* and if the UE supports UTRA:

3> include the UE radio access capabilities for UTRA within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *utra*;

2> if the *ue-CapabilityRequest* includes *cdma2000-1XRTT* and if the UE supports CDMA2000 1xRTT:

3> include the UE radio access capabilities for CDMA2000 within a *ue-Capability**RAT-Container* and with the *rat-Type* set to *cdma2000-1XRTT*;

2> if the *ue-CapabilityRequest* includes *nr* and if the UE supports NR:

3> include the UE radio access capabilities for NR within a *ue-CapabilityRAT-Container*, with the *rat-Type* set to *nr*;

3> include band combinations and feature sets as specified in TS 38.331 [82], clause 5.6.1.4, considering the included *requestedFreqBandsNR-MRDC*, *requestedCapabilityNR*, the *eutra-nr-only* flag and *requestedCapabilityCommon* (if present);

2> if the *ue-CapabilityRequest* includes *eutra-nr* and if the UE supports (NG)EN-DC or NE-DC:

3> include the UE radio access capabilities for EUTRA-NR within a *ue-CapabilityRAT-Container*, with the *rat-Type* set to *eutra-nr*;

3> include band combinations as specified in TS 38.331 [82], clause 5.6.1.4, considering the included *requestedFreqBandsNR-MRDC*, *requestedCapabilityNR* (if present) and *requestedCapabilityCommon* (if included)*;*

1> if the RRC message segmentation is enabled based on the field *rrc-SegAllowed* received, and the encoded RRC message is larger than the maximum supported size of a PDCP SDU specified in TS 36.323 [8]:

2> initiate the UL message segment transfer procedure as specified in clause 5.6.22;

1> else:

2> submit the *UECapabilityInformation* message to lower layers for transmission, upon which the procedure ends;

#### 5.6.8.2 Initiation

While T330 is running, the UE shall:

1> if measurement logging is suspended:

2> if during the last logging interval the IDC problems detected by the UE is resolved, resume measurement logging;

1> if not suspended, perform the logging in accordance with the following:

2> if *targetMBSFN-AreaList* is included in *VarLogMeasConfig*:

3> if the UE is camping normally on an E-UTRA cell or is connected to E-UTRA; and

3> if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*;and

3> if the PCell (in RRC\_CONNECTED) or cell where the UE is camping (in RRC\_IDLE) is part of the area indicated by *areaConfiguration* if configured in *VarLogMeasConfig*:

4> for MBSFN areas, indicated in *targetMBSFN-AreaList,* from which the UE is receiving MBMS service:

5> perform MBSFN measurements in accordance with the performance requirements as specified in TS 36.133 [16];

NOTE 1: When configured to perform MBSFN measurement logging by *targetMBSFN-AreaList*, the UE is not required to receive additional MBSFN subframes, i.e. logging is based on the subframes corresponding to the MBMS services the UE is receiving.

5> perform logging at regular time intervals as defined by the *loggingInterval* in *VarLogMeasConfig,* but only for those intervals for which MBSFN measurement results are available as specified in TS 36.133 [16];

2> else:

3> if the UE is in *any cell selection* state (as specified in TS 36.304 [4]):

4> perform the logging at regular time intervals, as defined by the *loggingInterval* in *VarLogMeasConfig*;

3> else if the UE is camping normally on an E-UTRA cell and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport* and, if the cell is part of the area indicated by *areaConfiguration* if configured in *VarLogMeasConfig*:

4> perform the logging at regular time intervals, as defined by the *loggingInterval* in *VarLogMeasConfig*;

2> when adding a logged measurement entry in *VarLogMeasReport*, include the fields in accordance with the following:

3> if the UE detected IDC problems during the last logging interval:

4> if *measResultServCell* in *VarLogMeasReport* is not empty:

5> include *inDeviceCoexDetected*;

5> suspend measurement logging from the next logging interval;

4> else:

5> suspend measurement logging;

NOTE 1A: The UE may detect the start of IDC problems as early as Phase 1 as described in clause 23.4 of TS 36.300 [9].

3> set the *relativeTimeStamp* to indicate the elapsed time since the moment at which the logged measurement configuration was received;

3> if detailed location information became available during the last logging interval, set the content of the *locationInfo* as follows:

4> include the *locationCoordinates*;

3> if *wlan-NameList* is included in *VarLogMeasConfig*:

4> if detailed WLAN measurements are available:

5> include *logMeasResultListWLAN*, in order of decreasing RSSI for WLAN APs;

3> if *bt-NameList* is included in *VarLogMeasConfig*:

4> if detailed Bluetooth measurements are available:

5> include *logMeasResultListBT*, in order of decreasing RSSI for Bluetooth beacons;

3> if *targetMBSFN-AreaList* is included in *VarLogMeasConfig*:

4> for each MBSFN area, for which the mandatory measurements result fields became available during the last logging interval:

5> set the *rsrpResultMBSFN*, *rsrqResultMBSFN* to include measurement results that became available during the last logging interval;

5> include the fields *signallingBLER-Result* or *dataBLER-MCH-ResultList* if the concerned BLER results are availble,

5> set the *mbsfn-AreaId* and *carrierFreq* to indicate the MBSFN area in which the UE is receiving MBSFN transmission;

4> if in RRC\_CONNECTED:

5> set the *servCellIdentity* to indicate global cell identity of the PCell;

5> set the *measResultServCell* to include the layer 3 filtered measured results of the PCell;

5> if available, set the *measResultNeighCells* to include the layer 3 filtered measured results of SCell(s) and neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSRP, for at most the following number of cells: 6 intra-frequency and 3 inter-frequency cells per frequency and according to the following:

6> for each cell included, include the optional fields that are available;

5> if available, optionally set the *measResultNeighCells* to include the layer 3 filtered measured results of neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSCP(UTRA)/RSSI(GERAN)/PilotStrength(cdma2000), for at most the following number of cells: 3 inter-RAT cells per frequency/set of frequencies (GERAN), and according to the following:

6> for each cell included, include the optional fields that are available;

4> if in RRC\_IDLE:

5> set the *servCellIdentity* to indicate global cell identity of the serving cell;

5> set the *measResultServCell* to include the quantities of the serving cell;

5> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency and according to the following:

6> for each neighbour cell included, include the optional fields that are available;

5> if available, optionally set the *measResultNeighCells,* in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval, for at most the following number of cells: 3 inter-RAT cells per frequency/set of frequencies (GERAN), and according to the following:

6> for each cell included, include the optional fields that are available;

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 2: The UE includes the latest results in accordance with the performance requirements as specified in TS 36.133 [16]. E.g. RSRP and RSRQ results are available only if the UE has a sufficient number of results/ receives a sufficient number of subframes during the logging interval.

3> else:

4> if the UE is in *any cell selection* state (as specified in TS 36.304 [4]):

5> set *anyCellSelectionDetected* to indicate the detection of no suitable or no acceptable cell found;

5> set the *servCellIdentity* to indicate global cell identity of the last logged cell that the UE was camping on;

5> set the *measResultServCell* to include the quantities of the last logged cell the UE was camping on;

4> else:

5> set the *servCellIdentity* to indicate global cell identity of the cell the UE is camping on;

5> set the *measResultServCell* to include the quantities of the cell the UE is camping on;

4> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/ set of frequencies (GERAN) per RAT and according to the following:

5> for each neighbour cell included, include the optional fields that are available;

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 3: The UE includes the latest results of the available measurements as used for cell reselection evaluation in RRC\_IDLE or as used for evaluation of reporting criteria or for measurement reporting according to 5.5.3 in RRC\_CONNECTED, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

2> when the memory reserved for the logged measurement information becomes full, stop timer T330 and perform the same actions as performed upon expiry of T330, as specified in 5.6.6.4;

### 5.6.13a NR SCG failure information

#### 5.6.13a.1 General



Figure 5.6.13a.1-1: NR SCG failure information

The purpose of this procedure is to inform E-UTRAN about an SCG failure the UE has experienced (e.g. SCG radio link failure, failure to successfully complete an SCG reconfiguration with sync), as specified in TS 38.331 [82], clause 5.7.3.2.

#### 5.10.7.3 Transmission of SLSS

The UE shall select the SLSSID and the subframe in which to transmit SLSS as follows:

1> if triggered by sidelink discovery announcement and in coverage on the frequency used for sidelink discovery, as defined in TS 36.304 [4], clause 11.4:

2> select the SLSSID included in the entry of *discSyncConfig* included in the received *SystemInformationBlockType19*, that includes *txParameters*;

2> use *syncOffsetIndicator* corresponding to the selected SLSSID;

2> for each pool used for the transmission of discovery announcements (each corresponding to the selected SLSSID):

3> if a subframe indicated by *syncOffsetIndicator* corresponds to the first subframe of the discovery transmission pool;

4> if *discTxGapConfig* is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:

5> select the concerned subframe;

3> else:

4> if *discTxGapConfig* is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:

5> select the subframe indicated by *syncOffsetIndicator* that precedes and which, in time domain, is nearest to the first subframe of the discovery transmission pool;

3> if the sidelink discovery announcements concern PS; and if *syncTxPeriodic* is included:

4> additionally select each subframe that periodically occurs 40 subframes after the selected subframe;

1> if triggered by sidelink communication and in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4], clause 11.4:

2> select the SLSSID included in the entry of *commSyncConfig* that is included in the received *SystemInformationBlockType18* and includes *txParameters*;

2> use *syncOffsetIndicator* corresponding to the selected SLSSID;

2> if in RRC\_CONNECTED; and if *networkControlledSyncTx* is configured and set to *on*:

3> select the subframe(s) indicated by *syncOffsetIndicator*;

2> else (when transmitting communication):

3> select the subframe(s) indicated by *syncOffsetIndicator* within the SC period in which the UE intends to transmit sidelink control information or data;

1> if triggered by V2X sidelink communication and in coverage on the frequency used for V2X sidelink communication, as defined in TS 36.304 [4], clause 11.4; or

1> if triggered by V2X sidelink communication, and out of coverage on the frequency used for V2X sidelink communication, and the concerned frequency is included in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration* or in *v2x-InterFreqInfoList* within *SystemInformationBlockType21* of the serving cell/ PCell;

2> if the UE has selected GNSS as synchronization reference in accordance with 5.10.8.2:

3> select SLSSID 0;

3> use *syncOffsetIndicator* included in the entry of *v2x-SyncConfig* corresponding to the concerned frequency in *v2x-InterFreqInfoList* or within *SystemInformationBlockType21*, that includes *txParameters* and *gnss-Sync*;

3> select the subframe(s) indicated by *syncOffsetIndicator*;

2> if the UE has selected a cell as synchronization reference in accordance with 5.10.8.2:

3> select the SLSSID included in the entry of *v2x-SyncConfig* configured for the concerned frequency in *v2x-InterFreqInfoList* or within *SystemInformationBlockType21*, that includes *txParameters* and does not include *gnss-Sync*;

3> use *syncOffsetIndicator* corresponding to the selected SLSSID;

3> select the subframe(s) indicated by *syncOffsetIndicator*;

1> else if triggered by V2X sidelink communication and the UE has GNSS as the synchronization reference:

2> select SLSSID 0;

2> if *syncOffsetIndicator3* is configured for the frequency used for V2X sidelink communication in *SL-V2X-Preconfiguration*:

3> select the subframe(s) indicated by *syncOffsetIndicator3*;

2> else:

3> select the subframe(s) indicated by *syncOffsetIndicator1*;

1> else:

2> select the synchronisation reference UE (i.e. SyncRef UE) as defined in 5.10.8;

2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message received from this UE is set to *TRUE*; or

2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message received from this UE is set to *FALSE* while the SLSS from this UE is part of the set defined for out of coverage, see TS 36.211 [21]:

3> select the same SLSSID as the SLSSID of the selected SyncRef UE;

3> select the subframe in which to transmit the SLSS according to the *syncOffsetIndicator1* or *syncOffsetIndicator2* included in the preconfigured sidelink parameters (i.e. *preconfigSync* in *SL-Preconfiguration* or *v2x-CommPreconfigSync* in *SL-V2X-Preconfiguration* defined in 9.3) corresponding to the concerned frequency, such that the subframe timing is different from the SLSS of the selected SyncRef UE;

2> else if the UE has a selected SyncRef UE and the SLSS from this UE was transmitted on the subframe indicated by *syncOffsetIndicator3* that is included in the *syncOffsetIndicators* in *SL-V2X-Preconfiguration*, and is corresponding to the frequency used for V2X sidelink communication:

3> select SLSSID 169;

3> select the subframe(s) indicated by *syncOffsetIndicator2*;

2> else if the UE has a selected SyncRef UE:

3> select the SLSSID from the set defined for out of coverage having an index that is 168 more than the index of the SLSSID of the selected SyncRef UE, see TS 36.211 [21];

3> select the subframe in which to transmit the SLSS according to *syncOffsetIndicator1* or *syncOffsetIndicator2* included in the preconfigured sidelink parameters (i.e. *preconfigSync* in *SL-Preconfiguration* or *v2x-CommPreconfigSync* in *SL-V2X-Preconfiguration* defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;

2> else (i.e. no SyncRef UE selected):

3> if the UE has not randomly selected an SLSSID:

4> if triggered by V2X sidelink communication, randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage except SLSSID 168 and 169, see TS 36.211 [21];

4> else, randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage, see TS 36.211 [21];

4> select the subframe in which to transmit the SLSS according to the *syncOffsetIndicator1* or *syncOffsetIndicator2* (arbitrary selection between these) included in the preconfigured sidelink parameters (i.e. *preconfigSync* in *SL-Preconfiguration* or *v2x-CommPreconfigSync* in *SL-V2X-Preconfiguration* defined in 9.3);

#### 5.10.8.2 Selection and reselection of synchronisation reference

The UE shall:

1> if triggered by V2X sidelink communication, and in coverage on the frequency for V2X sidelink communication; or

1> if triggered by V2X sidelink communication, and out of coverage on the frequency for V2X sidelink communication, and the frequency used to transmit V2X sidelink communication is included in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration* or in *v2x-InterFreqInfoList* within *SystemInformationBlockType21* or *SystemInformationBlockType26* of the serving cell/ PCell:

2> if *syncFreqList* is not included in *RRCConnectionReconfiguration* nor in *SystemInformationBlockType26*; or

2> if *syncFreqList* is included in *RRCConnectionReconfiguration* or in *SystemInformationBlockType26*, and none of the frequency(ies) selected as specified in TS 36.321 [6] is included in the *syncFreqList*; or

2> if *syncFreqList* is included in *RRCConnectionReconfiguration* or in *SystemInformationBlockType26*, and no synchronisation carrier frequency is selected as specified in 5.10.8a:

3> if *typeTxSync* is configured for the concerned frequency and set to *enb*:

4> select a cell as the synchronization reference source as defined in 5.10.13.3;

3> else if *typeTxSync* for the concerned frequency is not configured or is set to *gnss*, and GNSS is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:

4> select GNSS as the synchronization reference source;

3> else (i.e., there is no GNSS which is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]):

4> search SLSSID=0 on the concerned frequency to detect candidate SLSS, in accordance with TS 36.133 [16];

4> when evaluating the detected SLSS, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured *filterCoefficient* as defined in 9.3, before using the S-RSRP measurement results;

4> if the S-RSRP of the SyncRef UE identified by the detected SLSS exceeds the minimum requirement defined in TS 36.133 [16]:

5> select the SyncRef UE;

4> else (i.e., no SLSSID=0 detected):

5> select a cell as the synchronization reference source as defined in 5.10.13.3;

2> if *syncFreqList* is included in *RRCConnectionReconfiguration* or in *SystemInformationBlockType26*, and the UE has selected a synchronisation carrier frequency as specified in 5.10.8a:

3> consider the synchornisation reference source (i.e. eNB, GNSS or SyncRef UE) that is selected on the synchronisation carrier frequency as the synchronization reference;

1> else, if triggered by V2X sidelink communication, and out of coverage on the frequency for V2X sidelink communication, and for the frequency used for V2X sidelink communication, if *syncPriority* in *SL-V2X-Preconfiguration* is set to *gnss* and GNSS is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:

2> select GNSS as the synchronization reference source;

1> else, for the frequency used for sidelink communication, V2X sidelink communication or sidelink discovery, if out of coverage on that frequency as defined in TS 36.304 [4], clause 11.4:

2> if triggered by sidelink communication or sidelink discovery; or

2> if triggered by V2X sidelink communication, and *syncFreqList* is not included in *SL-V2X-Preconfiguration*; or

2> if triggered by V2X sidelink communication, and *syncFreqList* is included in *SL-V2X-Preconfiguration*, and none of the frequency(ies) selected as specified in TS 36.321 [6] is included in the *syncFreqList*; or

2> if triggered by V2X sidelink communication, and *syncFreqList* is included in *SL-V2X-Preconfiguration*, and no synchronisation carrier frequency is selected as specified in 5.10.8a:

3> perform a full search (i.e. covering all subframes and all possible SLSSIDs) to detect candidate SLSS, in accordance with TS 36.133 [16]

3> when evaluating the one or more detected SLSSIDs, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured *filterCoefficient* as defined in 9.3, before using the S-RSRP measurement results;

3> if the UE has selected a SyncRef UE:

4> if the S-RSRP of the strongest candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by *syncRefMinHyst* and the strongest candidate SyncRef UE belongs to the same priority group as the current SyncRef UE and the S-RSRP of the strongest candidate SyncRef UE exceeds the S-RSRP of the current SyncRef UE by *syncRefDiffHyst*; or

4> if the S-RSRP of the candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by *syncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than the current SyncRef UE; or

4> if GNSS becomes reliable in accordance with TS 36.101 [42] and TS 36.133 [16], and GNSS belongs to a higher priority group than the current SyncRef UE; or

4> if the S-RSRP of the current SyncRef UE is less than the minimum requirement defined in TS 36.133 [16]:

5> consider no SyncRef UE to be selected;

3> if the UE has selected GNSS as the synchronization reference for V2X sidelink communication:

4> if the S-RSRP of the candidate SyncRef UE exceeds the minimum requirement defined in TS 36.133 [16] by *syncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than GNSS; or

4> if GNSS becomes not reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:

5> consider GNSS not to be selected;

3> if the UE has not selected a SyncRef UE and has not selected GNSS as synchronization reference source:

4> if not concerning V2X sidelink communication, and if the UE detects one or more SLSSIDs for which the S-RSRP exceeds the minimum requirement defined in TS 36.133 [16] by *syncRefMinHyst* and for which the UE received the corresponding *MasterInformationBlock-SL* message (candidate SyncRef UEs), select a SyncRef UE according to the following priority group order:

5> UEs of which *inCoverage*, included in the *MasterInformationBlock-SL* message received from this UE, is set to *TRUE*, starting with the UE with the highest S-RSRP result (priority group 1);

5> UEs of which SLSSID is part of the set defined for in coverage, starting with the UE with the highest S-RSRP result (priority group 2);

5> Other UEs, starting with the UE with the highest S-RSRP result (priority group 3);

4> for V2X sidelink communication, if the UE detects one or more SLSSIDs for which the S-RSRP exceeds the minimum requirement defined in TS 36.133 [16] by *syncRefMinHyst* and for which the UE received the corresponding *MasterInformationBlock-SL-V2X* message (candidate SyncRef UEs), or if the UE detects GNSS that is reliable in accordance with TS 36.101 [42] and TS 36.133 [16], select a synchronization reference according to the following priority group order:

5> if *syncPriority* corresponding to the concerned frequency in *SL-V2X-Preconfiguration* is set to *enb*:

6> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, starting with the UE with the highest S-RSRP result (priority group 1);

6> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 2);

6> GNSS that is reliable in accordance with TS 36.101 [42] and TS 36.133 [16] (priority group 3);

6> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, or of which SLSSID is 0 and SLSS is transmitted on subframes indicated by *syncOffsetIndicator3,* starting with the UE with the highest S-RSRP result (priority group 4);

6> UEs of which SLSSID is 0 and is not transmitted on subframes indicated by *syncOffsetIndicator3*, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 5);

6> UEs of which SLSSID is 169, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 5);

6> Other UEs, starting with the UE with the highest S-RSRP result (priority group 6);

5> if *syncPriority* corresponding to the concerned frequency in *SL-V2X-Preconfiguration* is set to *gnss:*

6> GNSS that is reliable in accordance with TS 36.101 [42] and TS 36.133 [16] (priority group 1);

6> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, starting with the UE with the highest S-RSRP result (priority group 2);

6> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, or of which SLSSID is 0 and SLSS is transmitted on subframes indicated by *syncOffsetIndicator3,* starting with the UE with the highest S-RSRP result (priority group 2);

6> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 3);

6> UEs of which SLSSID is 0 and is not transmitted on subframes indicated by *syncOffsetIndicator3*, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 3);

6> UEs of which SLSSID is 169, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 3);

6> Other UEs, starting with the UE with the highest S-RSRP result (priority group 4);

2> if triggered by V2X sidelink communication, and *syncFreqList* is included in *SL-V2X-Preconfiguration*, and the UE has selected a synchronisation carrier frequency as specified in 5.10.8a;

3> consider the synchornization reference source (i.e. eNB, GNSS or SyncRef UE) that selected on the synchronisation carrier frequency as the synchronization reference;

### 5.10.8a Selection and reselection of synchronisation carrier frequency

For the frequency(ies) which are in coverage for the UE as defined in TS 36.304 [4], clause 11.4 and which have been selected for V2X sidelink communication as specified in TS 36.321 [6], and/or for the frequency(ies) which are out of coverage for the UE and included in *v2x-InterFreqInfoList* within *RRCConnectionReconfiguration* or *SystemInformationBlockType21* or *SystemInformationBlockType26* of the serving cell/ PCell and which have been selected for V2X sidelink communication as specified in TS 36.321 [6], the UE capable of V2X sidelink communication and synchronisation carrier frequency selection shall:

1> if *syncFreqList* is included in *RRCConnectionReconfiguration* or in *SystemInformationBlockType26*, and includes at least one of the concerned frequency(ies):

2> if no synchronisation carrier frequency is selected:

3> if *typeTxSync* is configured for the concerned frequency(ies) and set to *enb*; or

3> if *typeTxSync* for the concerned frequency(ies) is not configured or is set to *gnss*, and GNSS is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:

4> select one frequency from the concerned frequency(ies) which are included in *syncFreqList* as the synchronisation carrier frequency.

3> else (i.e., there is no GNSS which is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]):

4> select the synchronisation reference source(s) on the concerned frequency(ies) which are included in *syncFreqList* according to 5.10.8.2:

4> if SyncRef UE(s) with SLSSID=0 is detected on at least one frequency from the concerned frequency(ies):

5> select one frequency from the concerned frequency(ies) with the SyncRef UE(s) with SLSSID=0 detected as the synchronisation carrier frequency;

4> else (i.e., no SLSSID=0 detected and UE selects a cell as the synchronisation reference source):

5> select one frequency from the concerned frequencies which are included in *syncFreqList* as the synchronisation carrier frequency;

2> else (i.e. the synchronisation carrier frequency is selected):

3> if the UE selects GNSS as the synchronisation reference source, and GNSS is unreliable in accordance with TS 36.101 [42] and TS 36.133 [16]; or

3> if the UE selects a cell as the synchronisation reference source, and the cell cannot fulfil the S criterion in accordance with TS 36.304 [4]; or

3> if the UE selects a SyncRef UE and the S-RSRP of the current SyncRef UE is less than the minimum requirement defined in TS 36.133 [16]; or

3> if the synchronisation carrier frequency is not selected for V2X sidelink communication as specified in TS 36.321 [6]:

4> consider no synchronisation carrier frequency is selected;

For the frequency(ies) which are out of coverage for the UE and not included in *v2x-InterFreqInfoList* within *RRCConnectionReconfiguration* nor *SystemInformationBlockType21* nor *SystemInformationBlockType26* of the serving cell/ PCell and which have been selected for V2X sidelink carrier communication as specified in TS 36.321 [6], the UE capable of V2X sidelink communication and selection of synchronisation carrier frequency selection shall:

1> if *syncFreqList* is included in *SL-V2X-Preconfiguration*, and at least one of the concerned frequency(ies) is included in *syncFreqList*:

2> if no synchronisation carrier frequency is selected:

3> if *syncPriority* in *SL-V2X-Preconfiguration* is set to gnss and GNSS is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:

4> select one frequency from the concerned frequency(ies) which are included in *syncFreqList* as the synchronisation carrier frequency.

3> else:

4> select the synchronisation reference source(s) on the concerned frequency(ies) which are included in *SyncFreqList* according to 5.10.8.2;

4> select the frequency with the highest synchronisation reference source priority as the synchronisation carrier frequency, according to the following priority gourp order:

5> if *syncPriority* corresponding to the concerned frequency(ies) in *SL-V2X-Preconfiguration* is set to *enb*:

6> the frequency(ies) with SyncRef UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE* (priority group 1);

6> the frequency(ies) with SyncRef UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE* (priority group 2);

6> the frequency(ies) using GNSS as synchronisation reference source (priority group 3);

6> the frequency(ies) with SyncRef UE of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, or of which SLSSID is 0 and SLSS is transmitted on subframes indicated by *syncOffsetIndicator3* (priority group 4);

6> the frequency(ies) with SyncRef UE of which SLSSID is 0 and is not transmitted on subframes indicated by *syncOffsetIndicator3*, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE* (priority group 5);

6> the frequency(ies) with SyncRef UE of which SLSSID is 169, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE* (priority group 5);

6> the frequency(ies) with other SyncRef UE (priority group 6);

5> if *syncPriority* corresponding to the concerned frequency(ies) in *SL-V2X-Preconfiguration* is set to *gnss*:

6> the frequency(ies) with SyncRef UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE* (priority group 1);

6> the frequency(ies) with SyncRef UE of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, or of which SLSSID is 0 and SLSS is transmitted on subframes indicated by *syncOffsetIndicator3* (priority group 1);

6> the frequency(ies) with SyncRef UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE* (priority group 2);

6> the frequency(ies) with SyncRef UE of which SLSSID is 0 and is not transmitted on subframes indicated by *syncOffsetIndicator3*, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE* (priority group 2);

6> the frequency(ies) with SyncRef UE of which SLSSID is 169, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE* (priority group 2);

6> the frequency(ies) with other SyncRef UE (priority group 3);

2> else (i.e. the synchronisation carrier frequency is selected):

3> if the UE selects GNSS as the synchronisation reference source, and GNSS is unreliable in accordance with TS 36.101 [42] and TS 36.133 [16]; or

3> if the UE selects a SyncRef UE and the S-RSRP of the current SyncRef UE is less than the minimum requirement defined in TS 36.133 [16]; or

3> if the synchronisation carrier frequency is not selected for V2X sidelink communication as specified in TS 36.321 [6]:

4> consider no synchronisation carrier frequency is selected;

NOTE 1: If more than one selected carrier frequencies satisfy the condition as the synchronisation carrier frequency for V2X sidelink communication, how to select one synchronisation carrier frequency is up to UE implementation.

NOTE 2: All concerned carrier frequency(ies) have the same *typeTxSync* and *syncPriority* configured.

### 6.2.2 Message definitions

#### – *FailureInformation*

The *FailureInformation* message is used to provide information regarding failures detected by the UE, e.g. radio link failure for one of the RLC entities configured with PDCP duplication or failure of a DAPS HO.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*FailureInformation message*

-- ASN1START

FailureInformation-r15 ::= SEQUENCE {

 failedLogicalChannelInfo-r15 FailedLogicalChannelInfo-r15 OPTIONAL

 -- nonCriticalExtension is removed in this version as OPTIONAL was missing

}

FailureInformation-r16 ::= SEQUENCE {

 criticalExtensions CHOICE {

 failureInformation FailureInformation-r16-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

FailedLogicalChannelInfo-r15 ::= SEQUENCE {

 failedLogicalChannelIdentity-r15 SEQUENCE {

 cellGroupIndication-r15 ENUMERATED {mn, sn},

 logicalChannelIdentity-r15 INTEGER (1..10) OPTIONAL,

 logicalChannelIdentityExt-r15 INTEGER (32..38) OPTIONAL

 },

 failureType ENUMERATED {duplication, spare3, spare2, spare1}

}

FailureInformation-r16-IEs ::= SEQUENCE {

 failedLogicalChannelIdentity-r16 FailedLogicalChannelIdentity-r16 OPTIONAL,

 failureType-r16 ENUMERATED {duplication, dapsHO-failure,

 spare2, spare1} OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

FailedLogicalChannelIdentity-r16 ::= SEQUENCE {

 cellGroupIndication-r16 ENUMERATED {mn, sn},

 logicalChannelIdentity-r16 INTEGER (1..10) OPTIONAL,

 logicalChannelIdentityExt-r16 INTEGER (32..38) OPTIONAL

}

-- ASN1STOP

| *FailureInformation* field descriptions |
| --- |
| ***cellGroupIndication***This field indicates the cell group (MCG, SCG) of the RLC entity for which the PDCP duplication failure occurred. |
| ***failureType***This field indicates the type of failure reported. Value *duplication* indicates that a radio link failure for one of the RLC entities configured with PDCP duplication has been detected. Value *dapsHO-failure* indicates that timer T304 expired during a DAPS HO. |
| ***logicalChannelIdentity, logicalChannelIdentityExt***This field indicates the logical channel identity of the RLC entity for which the PDCP duplication failure occurred. |

NOTE: The UE may apply the *FailureInformation-r16* message to report a failure defined in REL-15, but only if it is configured with a feature incorporating a failure that can only be reported by the *FailureInformation-r16* message.

#### – *RRCConnectionResume*

The *RRCConnectionResume* message is used to resume the suspended RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E‑UTRAN to UE

*RRCConnectionResume* message

-- ASN1START

RRCConnectionResume-r13 ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 c1 CHOICE {

 rrcConnectionResume-r13 RRCConnectionResume-r13-IEs,

 spare3 NULL,

 spare2 NULL,

 spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionResume-r13-IEs ::= SEQUENCE {

 radioResourceConfigDedicated-r13 RadioResourceConfigDedicated OPTIONAL, -- Need ON

 nextHopChainingCount-r13 NextHopChainingCount,

 measConfig-r13 MeasConfig OPTIONAL, -- Need ON

 antennaInfoDedicatedPCell-r13 AntennaInfoDedicated-v10i0 OPTIONAL, -- Need ON

 drb-ContinueROHC-r13 ENUMERATED {true} OPTIONAL, -- Need OP

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 rrcConnectionResume-v1430-IEs RRCConnectionResume-v1430-IEs OPTIONAL

}

RRCConnectionResume-v1430-IEs ::= SEQUENCE {

 otherConfig-r14 OtherConfig-r9 OPTIONAL, -- Need ON

 rrcConnectionResume-v1510-IEs RRCConnectionResume-v1510-IEs OPTIONAL

}

RRCConnectionResume-v1510-IEs ::= SEQUENCE {

 sk-Counter-r15 INTEGER (0.. 65535) OPTIONAL, -- Need ON

 nr-RadioBearerConfig1-r15 OCTET STRING OPTIONAL, -- Need ON

 nr-RadioBearerConfig2-r15 OCTET STRING OPTIONAL, -- Need ON

 nonCriticalExtension RRCConnectionResume-v1530-IEs OPTIONAL

}

RRCConnectionResume-v1530-IEs ::= SEQUENCE {

 fullConfig-r15 ENUMERATED {true} OPTIONAL, -- Need ON

 nonCriticalExtension RRCConnectionResume-v1610-IEs OPTIONAL

}

RRCConnectionResume-v1610-IEs ::= SEQUENCE {

 idleModeMeasurementReq-r16 ENUMERATED {true} OPTIONAL, -- Need ON

 restoreMCG-SCells-r16 ENUMERATED {true} OPTIONAL, -- Need ON

 restoreSCG-r16 ENUMERATED {true} OPTIONAL, -- Cond EarlySec

 sCellToAddModList-r16 SCellToAddModList-r16 OPTIONAL, -- Cond EarlySec

 sCellToReleaseList-r16 SCellToReleaseListExt-r13 OPTIONAL, -- Need ON

 sCellGroupToReleaseList-r16 SCellGroupToReleaseList-r15 OPTIONAL, -- Need ON

 sCellGroupToAddModList-r16 SCellGroupToAddModList-r15 OPTIONAL, -- Cond EarlySec

 nr-SecondaryCellGroupConfig-r16 OCTET STRING OPTIONAL, -- Cond RestoreSCG

 p-MaxEUTRA-r16 P-Max OPTIONAL, -- Cond SCG

 p-MaxUE-FR1-r16 P-Max OPTIONAL, -- Cond SCG

 tdm-PatternConfig-r16 TDM-PatternConfig-r15 OPTIONAL, -- Cond FDD-PCell

 tdm-PatternConfig2-r16 TDM-PatternConfig-r15 OPTIONAL, -- Need OR

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionResume* field descriptions |
| --- |
| ***drb-ContinueROHC***This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with EUTRA PDCP and the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset.  |
| ***fullConfig***Indicates that the full configuration option is applicable for the *RRCConnectionResume* message. |
| ***idleModeMeasurementReq***This field indicates that the UE shall report the idle/inactive measurements to the network in the *RRCConnectionResumeComplete* message |
| ***p-MaxEUTRA***Indicates the maximum power available for E-UTRA. |
| ***p-MaxUE-FR1***The maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1) across all cell groups. The maximum transmit power that the UE may use may be additionally limited on cell- or cell-group level. |
| ***nr-RadioBearerConfig1, nr-RadioBearerConfig2***Includes the NR *RadioBearerConfig* IE as specified in TS 38.331 [82]. The field includes the configuration of RBs configured with NR PDCP. |
| ***nr-SecondaryCellGroupConfig***Includes the NR *RRCReconfiguration* message as specified in TS 38.331 [82]. In this version of the specification, the NR RRC message only includes fields *secondaryCellGroup*, with at least *reconfigurationWithSync, otherConfig* and/ or *measConfig*. |
| ***restoreMCG-Scells***Indicates that the UE shall restore the MCG Scell configurations from the UE AS Context or UE Inactive AS Context, if configured. |
| ***restoreSCG***If included, the UE shall restore the SCG configurations from the UE AS Context or UE Inactive AS Context. |
| ***sCellGroupToAddModList***Indicates the SCell group to be added or modified. |
| ***sCellGroupToReleaseList***Indicates the SCell group to be released. |
| ***sCellToAddModList***List of SCells to be added or modified. |
| ***sCellToReleaseList***List of SCells to be released. |
| ***sk-Counter***A one-shot counter used upon initial configuration of S-KgNB as well as upon refresh of S-KgNB. E-UTRAN provides this field when the UE is configured with an (SN-terminated) RB using S-KgNB or NR SCG is configured. |
| ***tdm-PatternConfig***This field is used when power control or IMD issues require single UL transmission in (NG)EN-DC as specified in TS 38.101-3 [101] and TS 38.213 [88]. |
| ***tdm-PatternConfig2***This field is used for dual UL transmission in EN-DC with LTE FDD PCell and for single UL transmission in EN-DC with LTE FDD/TDD PCell, as specified in TS 38.101-3 [101] and TS 38.213 [88].The network sets at most one of *tdm-PatternConfig* and *tdm-PatternConfig2* to setup.When this field is configured in EN-DC with LTE TDD PCell, it is not applicable if TDD configuration is sa0 or sa6 in SIB1. |

| Conditional presence | Explanation |
| --- | --- |
| *EarlySec* | For EPC, the field is optionally present, Need ON, if the UE supports early security reactivation; otherwise the field is not present.For 5GC, the field is optionally present, Need ON. |
| *RestoreSCG* | The field is mandatory present if *restoreSCG* is configured. It is optionally present, Need ON, otherwise.For EPC, this field can be present only if the UE supports early security reactivation. |
| *FDD-PCell* | This field is optionally present, need ON, for an FDD PCell if there is no SCell with configured uplink. Otherwise, the field is not present, need OR. |
| *SCG* | This field is optionally present, need OR, if *nr-SecondaryCellGroupConfig* is present, otherwise it is absent, need OR. |

#### – *UEInformationResponse*

The *UEInformationResponse* message is used by the UE to transfer the information requested by the E-UTRAN.

Signalling radio bearer: SRB1 or SRB2 (when logged measurement information is included)

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

*UEInformationResponse message*

-- ASN1START

UEInformationResponse-r9 ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 c1 CHOICE {

 ueInformationResponse-r9 UEInformationResponse-r9-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

UEInformationResponse-r9-IEs ::= SEQUENCE {

 rach-Report-r9 RACH-Report-r16 OPTIONAL,

 rlf-Report-r9 RLF-Report-r9 OPTIONAL,

 nonCriticalExtension UEInformationResponse-v930-IEs OPTIONAL

}

-- Late non critical extensions

UEInformationResponse-v9e0-IEs ::= SEQUENCE {

 rlf-Report-v9e0 RLF-Report-v9e0 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- Regular non critical extensions

UEInformationResponse-v930-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING (CONTAINING UEInformationResponse-v9e0-IEs) OPTIONAL,

 nonCriticalExtension UEInformationResponse-v1020-IEs OPTIONAL

}

UEInformationResponse-v1020-IEs ::= SEQUENCE {

 logMeasReport-r10 LogMeasReport-r10 OPTIONAL,

 nonCriticalExtension UEInformationResponse-v1130-IEs OPTIONAL

}

UEInformationResponse-v1130-IEs ::= SEQUENCE {

 connEstFailReport-r11 ConnEstFailReport-r11 OPTIONAL,

 nonCriticalExtension UEInformationResponse-v1250-IEs OPTIONAL

}

UEInformationResponse-v1250-IEs ::= SEQUENCE {

 mobilityHistoryReport-r12 MobilityHistoryReport-r12 OPTIONAL,

 nonCriticalExtension UEInformationResponse-v1530-IEs OPTIONAL

}

UEInformationResponse-v1530-IEs ::= SEQUENCE {

 measResultListIdle-r15 MeasResultListIdle-r15 OPTIONAL,

 flightPathInfoReport-r15 FlightPathInfoReport-r15 OPTIONAL,

 nonCriticalExtension UEInformationResponse-v1610-IEs OPTIONAL

}

UEInformationResponse-v1610-IEs ::= SEQUENCE {

 rach-Report-v1610 RACH-Report-v1610 OPTIONAL,

 measResultListExtIdle-r16 MeasResultListExtIdle-r16 OPTIONAL,

 measResultListIdleNR-r16 MeasResultListIdleNR-r16 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

RACH-Report-r16 ::= SEQUENCE {

 numberOfPreamblesSent-r16 NumberOfPreamblesSent-r11,

 contentionDetected-r16 BOOLEAN

}

RACH-Report-v1610 ::= SEQUENCE {

 initialCEL-r16 INTEGER (0..3),

 edt-Fallback-r16 BOOLEAN

}

RLF-Report-r9 ::= SEQUENCE {

 measResultLastServCell-r9 SEQUENCE {

 rsrpResult-r9 RSRP-Range,

 rsrqResult-r9 RSRQ-Range OPTIONAL

 },

 measResultNeighCells-r9 SEQUENCE {

 measResultListEUTRA-r9 MeasResultList2EUTRA-r9 OPTIONAL,

 measResultListUTRA-r9 MeasResultList2UTRA-r9 OPTIONAL,

 measResultListGERAN-r9 MeasResultListGERAN OPTIONAL,

 measResultsCDMA2000-r9 MeasResultList2CDMA2000-r9 OPTIONAL

 } OPTIONAL,

 ...,

 [[ locationInfo-r10 LocationInfo-r10 OPTIONAL,

 failedPCellId-r10 CHOICE {

 cellGlobalId-r10 CellGlobalIdEUTRA,

 pci-arfcn-r10 SEQUENCE {

 physCellId-r10 PhysCellId,

 carrierFreq-r10 ARFCN-ValueEUTRA

 }

 } OPTIONAL,

 reestablishmentCellId-r10 CellGlobalIdEUTRA OPTIONAL,

 timeConnFailure-r10 INTEGER (0..1023) OPTIONAL,

 connectionFailureType-r10 ENUMERATED {rlf, hof} OPTIONAL,

 previousPCellId-r10 CellGlobalIdEUTRA OPTIONAL

 ]],

 [[ failedPCellId-v1090 SEQUENCE {

 carrierFreq-v1090 ARFCN-ValueEUTRA-v9e0

 } OPTIONAL

 ]],

 [[ basicFields-r11 SEQUENCE {

 c-RNTI-r11 C-RNTI,

 rlf-Cause-r11 ENUMERATED {

 t310-Expiry, randomAccessProblem,

 rlc-MaxNumRetx, t312-Expiry-r12},

 timeSinceFailure-r11 TimeSinceFailure-r11

 } OPTIONAL,

 previousUTRA-CellId-r11 SEQUENCE {

 carrierFreq-r11 ARFCN-ValueUTRA,

 physCellId-r11 CHOICE {

 fdd-r11 PhysCellIdUTRA-FDD,

 tdd-r11 PhysCellIdUTRA-TDD

 },

 cellGlobalId-r11 CellGlobalIdUTRA OPTIONAL

 } OPTIONAL,

 selectedUTRA-CellId-r11 SEQUENCE {

 carrierFreq-r11 ARFCN-ValueUTRA,

 physCellId-r11 CHOICE {

 fdd-r11 PhysCellIdUTRA-FDD,

 tdd-r11 PhysCellIdUTRA-TDD

 }

 } OPTIONAL

 ]],

 [[ failedPCellId-v1250 SEQUENCE {

 tac-FailedPCell-r12 TrackingAreaCode

 } OPTIONAL,

 measResultLastServCell-v1250 RSRQ-Range-v1250 OPTIONAL,

 lastServCellRSRQ-Type-r12 RSRQ-Type-r12 OPTIONAL,

 measResultListEUTRA-v1250 MeasResultList2EUTRA-v1250 OPTIONAL

 ]],

 [[ drb-EstablishedWithQCI-1-r13 ENUMERATED {qci1} OPTIONAL

 ]],

 [[ measResultLastServCell-v1360 RSRP-Range-v1360 OPTIONAL

 ]],

 [[ logMeasResultListBT-r15 LogMeasResultListBT-r15 OPTIONAL,

 logMeasResultListWLAN-r15 LogMeasResultListWLAN-r15 OPTIONAL

 ]],

 [[ measResultListNR-r16 MeasResultCellListNR-r15 OPTIONAL,

 previousNR-PCellId-r16 CellGlobalIdNR-r16 OPTIONAL,

 failedNR-PCellId-r16 CHOICE {

 cellGlobalId CellGlobalIdNR-r16,

 pci-arfcn SEQUENCE {

 physCellId-r16 PhysCellIdNR-r15,

 carrierFreq-r16 ARFCN-ValueNR-r15

 }

 } OPTIONAL,

 reconnectCellId-r16 CHOICE {

 nrReconnectCellId CellGlobalIdNR-r16,

 eutraReconnectCellId SEQUENCE {

 cellGlobalId-r16 CellGlobalIdEUTRA,

 trackingAreaCode-EPC-r16 TrackingAreaCode OPTIONAL,

 trackingAreaCode-5GC-r16 TrackingAreaCode-5GC-r15 OPTIONAL

 }

 } OPTIONAL,

 timeUntilReconnection-r16 TimeUntilReconnection-r16 OPTIONAL

 ]],

 [[ measResultListNR-v1640 SEQUENCE {

 carrierFreqNR-r16 ARFCN-ValueNR-r15

 } OPTIONAL,

 measResultListExtNR-r16 MeasResultFreqListNR-r16 OPTIONAL

 ]]

}

RLF-Report-v9e0 ::= SEQUENCE {

 measResultListEUTRA-v9e0 MeasResultList2EUTRA-v9e0

}

MeasResultList2EUTRA-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r9

MeasResultList2EUTRA-v9e0 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v9e0

MeasResultList2EUTRA-v1250 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v1250

MeasResult2EUTRA-r9 ::= SEQUENCE {

 carrierFreq-r9 ARFCN-ValueEUTRA,

 measResultList-r9 MeasResultListEUTRA

}

MeasResult2EUTRA-v9e0 ::= SEQUENCE {

 carrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0 OPTIONAL

}

MeasResult2EUTRA-v1250 ::= SEQUENCE {

 rsrq-Type-r12 RSRQ-Type-r12 OPTIONAL

}

MeasResultList2UTRA-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2UTRA-r9

MeasResult2UTRA-r9 ::= SEQUENCE {

 carrierFreq-r9 ARFCN-ValueUTRA,

 measResultList-r9 MeasResultListUTRA

}

MeasResultList2CDMA2000-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2CDMA2000-r9

MeasResult2CDMA2000-r9 ::= SEQUENCE {

 carrierFreq-r9 CarrierFreqCDMA2000,

 measResultList-r9 MeasResultsCDMA2000

}

LogMeasReport-r10 ::= SEQUENCE {

 absoluteTimeStamp-r10 AbsoluteTimeInfo-r10,

 traceReference-r10 TraceReference-r10,

 traceRecordingSessionRef-r10 OCTET STRING (SIZE (2)),

 tce-Id-r10 OCTET STRING (SIZE (1)),

 logMeasInfoList-r10 LogMeasInfoList-r10,

 logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,

 ...,

 [[ logMeasAvailableBT-r15 ENUMERATED {true} OPTIONAL,

 logMeasAvailableWLAN-r15 ENUMERATED {true} OPTIONAL

 ]]

}

LogMeasInfoList-r10 ::= SEQUENCE (SIZE (1..maxLogMeasReport-r10)) OF LogMeasInfo-r10

LogMeasInfo-r10 ::= SEQUENCE {

 locationInfo-r10 LocationInfo-r10 OPTIONAL,

 relativeTimeStamp-r10 INTEGER (0..7200),

 servCellIdentity-r10 CellGlobalIdEUTRA,

 measResultServCell-r10 SEQUENCE {

 rsrpResult-r10 RSRP-Range,

 rsrqResult-r10 RSRQ-Range

 },

 measResultNeighCells-r10 SEQUENCE {

 measResultListEUTRA-r10 MeasResultList2EUTRA-r9 OPTIONAL,

 measResultListUTRA-r10 MeasResultList2UTRA-r9 OPTIONAL,

 measResultListGERAN-r10 MeasResultList2GERAN-r10 OPTIONAL,

 measResultListCDMA2000-r10 MeasResultList2CDMA2000-r9 OPTIONAL

 } OPTIONAL,

 ...,

 [[ measResultListEUTRA-v1090 MeasResultList2EUTRA-v9e0 OPTIONAL

 ]],

 [[ measResultListMBSFN-r12 MeasResultListMBSFN-r12 OPTIONAL,

 measResultServCell-v1250 RSRQ-Range-v1250 OPTIONAL,

 servCellRSRQ-Type-r12 RSRQ-Type-r12 OPTIONAL,

 measResultListEUTRA-v1250 MeasResultList2EUTRA-v1250 OPTIONAL

 ]],

 [[ inDeviceCoexDetected-r13 ENUMERATED {true} OPTIONAL

 ]],

 [[ measResultServCell-v1360 RSRP-Range-v1360 OPTIONAL

 ]],

 [[ logMeasResultListBT-r15 LogMeasResultListBT-r15 OPTIONAL,

 logMeasResultListWLAN-r15 LogMeasResultListWLAN-r15 OPTIONAL

 ]],

 [[ anyCellSelectionDetected-r15 ENUMERATED {true} OPTIONAL

 ]],

 [[ measResultListNR-r16 MeasResultCellListNR-r15 OPTIONAL

 ]],

 [[ measResultListNR-v1640 SEQUENCE {

 carrierFreqNR-r16 ARFCN-ValueNR-r15

 } OPTIONAL,

 measResultListExtNR-r16 MeasResultFreqListNR-r16 OPTIONAL

 ]]

}

MeasResultListMBSFN-r12 ::= SEQUENCE (SIZE (1..maxMBSFN-Area)) OF MeasResultMBSFN-r12

MeasResultMBSFN-r12 ::= SEQUENCE {

 mbsfn-Area-r12 SEQUENCE {

 mbsfn-AreaId-r12 MBSFN-AreaId-r12,

 carrierFreq-r12 ARFCN-ValueEUTRA-r9

 },

 rsrpResultMBSFN-r12 RSRP-Range,

 rsrqResultMBSFN-r12 MBSFN-RSRQ-Range-r12,

 signallingBLER-Result-r12 BLER-Result-r12 OPTIONAL,

 dataBLER-MCH-ResultList-r12 DataBLER-MCH-ResultList-r12 OPTIONAL,

 ...

}

DataBLER-MCH-ResultList-r12 ::= SEQUENCE (SIZE (1.. maxPMCH-PerMBSFN)) OF DataBLER-MCH-Result-r12

DataBLER-MCH-Result-r12 ::= SEQUENCE {

 mch-Index-r12 INTEGER (1..maxPMCH-PerMBSFN),

 dataBLER-Result-r12 BLER-Result-r12

}

BLER-Result-r12 ::= SEQUENCE {

 bler-r12 BLER-Range-r12,

 blocksReceived-r12 SEQUENCE {

 n-r12 BIT STRING (SIZE (3)),

 m-r12 BIT STRING (SIZE (8))

 }

}

BLER-Range-r12 ::= INTEGER(0..31)

MeasResultList2GERAN-r10 ::= SEQUENCE (SIZE (1..maxCellListGERAN)) OF MeasResultListGERAN

MeasResultFreqListNR-r16::= SEQUENCE (SIZE (1..maxFreq-1-r16)) OF MeasResultFreqFailNR-r15

ConnEstFailReport-r11 ::= SEQUENCE {

 failedCellId-r11 CellGlobalIdEUTRA,

 locationInfo-r11 LocationInfo-r10 OPTIONAL,

 measResultFailedCell-r11 SEQUENCE {

 rsrpResult-r11 RSRP-Range,

 rsrqResult-r11 RSRQ-Range OPTIONAL

 },

 measResultNeighCells-r11 SEQUENCE {

 measResultListEUTRA-r11 MeasResultList2EUTRA-r9 OPTIONAL,

 measResultListUTRA-r11 MeasResultList2UTRA-r9 OPTIONAL,

 measResultListGERAN-r11 MeasResultListGERAN OPTIONAL,

 measResultsCDMA2000-r11 MeasResultList2CDMA2000-r9 OPTIONAL

 } OPTIONAL,

 numberOfPreamblesSent-r11 NumberOfPreamblesSent-r11,

 contentionDetected-r11 BOOLEAN,

 maxTxPowerReached-r11 BOOLEAN,

 timeSinceFailure-r11 TimeSinceFailure-r11,

 measResultListEUTRA-v1130 MeasResultList2EUTRA-v9e0 OPTIONAL,

 ...,

 [[ measResultFailedCell-v1250 RSRQ-Range-v1250 OPTIONAL,

 failedCellRSRQ-Type-r12 RSRQ-Type-r12 OPTIONAL,

 measResultListEUTRA-v1250 MeasResultList2EUTRA-v1250 OPTIONAL

 ]],

 [[ measResultFailedCell-v1360 RSRP-Range-v1360 OPTIONAL

 ]],

 [[ logMeasResultListBT-r15 LogMeasResultListBT-r15 OPTIONAL,

 logMeasResultListWLAN-r15 LogMeasResultListWLAN-r15 OPTIONAL

 ]],

 [[ measResultListNR-r16 MeasResultCellListNR-r15 OPTIONAL

 ]],

 [[ measResultListNR-v1640 SEQUENCE {

 carrierFreqNR-r16 ARFCN-ValueNR-r15

 } OPTIONAL,

 measResultListExtNR-r16 MeasResultFreqListNR-r16 OPTIONAL

 ]]

}

NumberOfPreamblesSent-r11::= INTEGER (1..200)

TimeSinceFailure-r11 ::= INTEGER (0..172800)

TimeUntilReconnection-r16 ::= INTEGER (0..172800)

MobilityHistoryReport-r12 ::= VisitedCellInfoList-r12

FlightPathInfoReport-r15 ::= SEQUENCE {

 flightPath-r15 SEQUENCE (SIZE (1..maxWayPoint-r15)) OF WayPointLocation-r15 OPTIONAL,

 dummy SEQUENCE {} OPTIONAL

}

WayPointLocation-r15 ::= SEQUENCE {

 wayPointLocation-r15 LocationInfo-r10,

 timeStamp-r15 AbsoluteTimeInfo-r10 OPTIONAL

}

-- ASN1STOP

| *UEInformationResponse* field descriptions |
| --- |
| ***absoluteTimeStamp***Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within *absoluteTimeInfo*. |
| ***anyCellSelectionDetected***This field is used to indicate the detection of *any cell selection* state, as defined in TS 36.304 [4]. The UE sets this field when performing the logging of measurement results in RRC\_IDLE and there is no suitable cell or no acceptable cell. |
| ***bler***Indicates the measured BLER value. The coding of BLER value is defined in TS 36.133 [16]. |
| ***blocksReceived***Indicates total number of MCH blocks, which were received by the UE and used for the corresponding BLER calculation, within the measurement period as defined in TS 36.133 [16]. |
| ***carrierFreq***In case the UE includes *carrierFreq-v9e0* and/ or *carrierFreq-v1090*, the UE shall set the corresponding entry of *carrierFreq-r9* and/ or *carrierFreq-r10* respectively to *maxEARFCN*. For E-UTRA and UTRA frequencies, the UE sets the ARFCN according to the band used when obtaining the concerned measurement results. |
| ***carrierFreqNR***In case the UE includes *measResultListNR*, the UE uses this field to indicate the ARFCN value according to the band used when obtaining the concrned measurement results |
| ***connectionFailureType***This field is used to indicate whether the connection failure is due to radio link failure or handover failure. |
| ***contentionDetected***This field is used to indicate that contention was detected for at least one of the transmitted preambles, see TS 36.321 [6].  |
| ***c-RNTI***This field indicates the C-RNTI used in the PCell upon detecting radio link failure or the C-RNTI used in the source PCell upon handover failure. |
| ***dataBLER-MCH-ResultList***Includes a BLER result per MCH on subframes using *dataMCS*, with the applicable MCH(s) listed in the same order as in *pmch-InfoList* within *MBSFNAreaConfiguration*. |
| ***drb-EstablishedWithQCI-1***This field is used to indicate the radio link failure occurred while a bearer with QCI value equal to 1 was configured, see TS 24.301 [35]. |
| ***dummy***This field is not used in the specification. It shall not be sent by the UE. |
| ***edt-Fallback***Value TRUE indicates the last successfully completed random access procedure was initiated with EDT PRACH resource and succeeded after receiving EDT fallback indication from lower layers. |
| ***failedCellId***This field is used to indicate the cell in which connection establishment failed. |
| ***failedPCellId***This field is used to indicate the PCell in which RLF is detected or the target PCell of the failed handover. The UE sets the EARFCN according to the band used for transmission/ reception when the failure occurred. |
| ***inDeviceCoexDetected***Indicates that measurement logging is suspended due to IDC problem detection. |
| ***initialCEL***Indicates the initial CE level used for the last successfully completed random access procedure for BL UEs and UEs in CE. |
| ***logMeasResultListBT***This field refers to the Bluetooth measurement results. |
| ***logMeasResultListWLAN***This field refers to the WLAN measurement results. |
| ***maxTxPowerReached***This field is used to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6]. |
| ***mch-Index***Indicates the MCH by referring to the entry as listed in *pmch-InfoList* within *MBSFNAreaConfiguration*. |
| ***measResultFailedCell***This field refers to the last measurement results taken in the cell, where connection establishment failure happened. For UE supporting CE Mode B, when CE mode B is not restricted by upper layers, *measResultFailedCell-v1360* is reported if the measured RSRP is less than -140 dBm. |
| ***measResultLastServCell***This field refers to the last measurement results taken in the PCell, where radio link failure or handover failure happened. For BL UEs or UEs in CE, when operating in CE Mode B, *measResultLastServCell-v1360* is reported if the measured RSRP is less than -140 dBm. |
| ***measResultListEUTRA***If *measResultListEUTRA-v9e0*, *measResultListEUTRA-v1090* or *measResultListEUTRA-v1130* is included, the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r9*, *measResultListEUTRA-r10* and/ or *measResultListEUTRA-r11* respectively. |
| ***measResultListEUTRA-v1250***If included in *RLF-Report-r9* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r9*;If included in *LogMeasInfo-r10* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r10*;If included in *ConnEstFailReport-r11* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r11*; |
| ***measResultListIdle***This field indicates the E-UTRA measurement results done during RRC\_IDLE and RRC\_INACTIVE at network request. |
| ***measResultListIdleNR***This field indicates the NR measurement results done during RRC\_IDLE and RRC\_INACTIVE at network request. |
| ***measResultListNR, measResultListExtNR***Includes NR measurement results, with *measResultListNR* including results of a first NR frequency and *measResultListExtNR* including results of additinal NR frequencies, if available. |
| ***measResultServCell***This field refers to the log measurement results taken in the Serving cell. For UE supporting CE Mode B, when CE mode B is not restricted by upper layers, *measResultServCell-v1360* is reported if the measured RSRP is less than -140 dBm. |
| ***mobilityHistoryReport***This field is used to indicate the time of stay in 16 most recently visited E-UTRA cells or of stay out of E-UTRA. |
| ***numberOfPreamblesSent***This field is used to indicate the number of RACH preambles that were transmitted. Corresponds to parameter PREAMBLE\_TRANSMISSION\_COUNTER in TS 36.321 [6]. |
| ***previousPCellId***This field is used to indicate the source PCell of the last handover (source PCell when the last *RRCConnectionReconfiguration* message including *mobilityControlInfo* was received). |
| ***previousUTRA-CellId***This field is used to indicate the source UTRA cell of the last successful handover to E-UTRAN, when RLF occurred at the target PCell. The UE sets the ARFCN according to the band used for transmission/ reception on the concerned cell. |
| ***reconnectCellId***This field is used to indicate the cell in which the UE comes back to connected after connection failure and after failing to perform reestablishment. If the UE comes back to RRC CONNECTED in an NR cell then *nrReconnectCellID* is included and if the UE comes back to RRC CONNECTED in an LTE cell then *eutraReconnectCellID* is included. |
| ***reestablishmentCellId***This field is used to indicate the cell in which the re-establishment attempt was made after connection failure. |
| ***relativeTimeStamp***Indicates the time of logging measurement results, measured relative to the *absoluteTimeStamp*. Value in seconds. |
| ***rlf-Cause***This field is used to indicate the cause of the last radio link failure that was detected. In case of handover failure information reporting (i.e., the *connectionFailureType* is set to '*hof*'), the UE is allowed to set this field to any value. |
| ***selectedUTRA-CellId***This field is used to indicate the UTRA cell that the UE selects after RLF is detected, while T311 is running. The UE sets the ARFCN according to the band selected for transmission/ reception on the concerned cell. |
| ***signallingBLER-Result***Includes a BLER result of MBSFN subframes using *signallingMCS*.  |
| ***tac-FailedPCell***This field is used to indicate the Tracking Area Code of the PCell in which RLF is detected. |
| ***tce-Id***Parameter Trace Collection Entity Id: See TS 32.422 [58]. |
| ***timeConnFailure***This field is used to indicate the time elapsed since the last HO initialization until connection failure. Actual value = field value \* 100ms. The maximum value 1023 means 102.3s or longer. |
| ***timeSinceFailure***This field is used to indicate the time that elapsed since the connection (establishment) failure. Value in seconds. The maximum value 172800 means 172800s or longer. |
| ***timeStamp***Includes time stamps for the waypoints that describe planned locations for the UE. |
| ***timeUntilReconnection***This field is used to indicate the time that elapsed between the connection (radio link or handover) failure and the next time the UE comes to RRC CONNECTED in an NR or EUTRA cell, after failing to perform reestablishment. Value in seconds. The maximum value 172800 means 172800s or longer. |
| ***traceRecordingSessionRef***Parameter Trace Recording Session Reference: See TS 32.422 [58]. |
| ***wayPointLocation***Includes location coordinates for a UE for Aerial UE operation. The waypoints describe planned locations for the UE. |

#### 6.7.3.6 NB-IoT Other information elements

#### – *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,

 measParameters-r16 MeasParameters-NB-r16,

 tdd-UE-Capability-v1610 TDD-UE-Capability-NB-v1610 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

}

MeasParameters-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 |
| ***dataInactMon***Indicates whether the UE supports the data inactivity monitoring as specified in TS 36.321 [6]. | FDD/TDD | No |
| ***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 |

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*.

## 7.3 Timers

### 7.3.1 Timers (Informative)

| Timer | Start | Stop | At expiry |
| --- | --- | --- | --- |
| T300NOTE1 | Transmission of *RRCConnectionRequest* or *RRCConnectionResumeRequest* or *RRCEarlyDataRequest* | Reception of *RRCConnectionSetup*, *RRCConnectionReject* or *RRCConnectionResume* or *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT, cell re-selection and upon abortion of connection establishment by upper layers | Perform the actions as specified in 5.3.3.6 |
| T301NOTE1 | Transmission of *RRCConnectionReestabilshmentRequest* | Reception of *RRCConnectionReestablishment* or *RRCConnectionReestablishmentReject* message as well as when the selected cell becomes unsuitable | Go to RRC\_IDLE |
| T302 | Reception of *RRCConnectionReject* while performing RRC connection establishment or reception of *RRCConnectionRelease* including *waitTime* | Upon entering RRC\_CONNECTED and upon cell re-selection, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR, or upon reception of *RRCConnectionReject* message for E-UTRA/5GC. | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T303 | Access barred while performing RRC connection establishment for mobile originating calls | Upon entering RRC\_CONNECTED and upon cell re-selection, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR. | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T304 | Reception of *RRCConnectionReconfiguration* message including the *MobilityControl Info* orreception of *MobilityFromEUTRACommand* message including *CellChangeOrder* or upon conditional reconfiguration execution i.e. when applying a stored *RRCConnectionReconfiguration* message including the *MobilityControl Info*. | Criterion for successful completion of handover within E-UTRA, handover to E-UTRA or cell change order is met (the criterion is specified in the target RAT in case of inter-RAT) | In case of cell change order from E-UTRA or intra E-UTRA handover, initiate the RRC connection re-establishment procedure; In case of handover to E-UTRA, perform the actions defined in the specifications applicable for the source RAT; If any DAPS bearer is configured and if there is no RLF in source PCell, initiate the failure information procedure. |
| T305 | Access barred while performing RRC connection establishment for mobile originating signalling | Upon entering RRC\_CONNECTED and upon cell re-selection, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR. | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T306 | Access barred while performing RRC connection establishment for mobile originating CS fallback. | Upon entering RRC\_CONNECTED and upon cell re-selection, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR. | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T307 | Reception of *RRCConnectionReconfiguration* message including *MobilityControlInfoSCG* | Successful completion of random access on the PSCell, upon initiating re-establishment and upon SCG release | Initiate the SCG failure information procedure as specified in 5.6.13. |
| T308 | Access barred due to ACDC while performing RRC connection establishment subject to ACDC | Upon entering RRC\_CONNECTED and upon cell re-selection, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR. | Inform upper layers about barring alleviation for ACDC as specified in 5.3.3.7 |
| T309NOTE1 | When access attempt is barred at access barring check for an Access Category. The UE shall maintain one instance of this timer per Access Category. | Upon entering RRC\_CONNECTED, upon cell (re)selection, upon reception of *RRCConnectionRelease,* upon change of PCell while in RRC\_CONNECTED, or upon reception of *MobilityFromEUTRACommand*. | Perform the actions as specified in 5.3.16.4. |
| T310NOTE1NOTE2 | Upon detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive out-of-sync indications from lower layers | Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure, upon initiating the connection re-establishment procedure, and upon initiating the MCG failure information procedure. | If security is not activated and the UE is not a NB-IoT UE that supports RRC connection re-establishment for the Control Plane CIoT EPS/5GS optimisation: go to RRC\_IDLE else: initiate the MCG failure information procedure as specified in 5.6.26 or the connection re-establishment procedure as specified in 5.3.7. |
| T311NOTE1 | Upon initiating the RRC connection re-establishment procedure | Selection of a suitable E-UTRA cell or a cell using another RAT. | Go to RRC\_IDLE |
| T312NOTE2 | Upon triggering a measurement report for a measurement identity for which T312 has been configured and *useT312* has been set to true, while T310 is running | Upon receiving N311 consecutive in-sync indications from lower layers, upon triggering the handover procedure, upon initiating the connection re-establishment procedure, upon initiating the MCG failure information procedure, and upon the expiry of T310 | Initiate the MCG failure information procedure as specified in 5.6.26 or the connection re-establishment procedure as specified in 5.3.7. |
| T313NOTE2 | Upon detecting physical layer problems for the PSCell i.e. upon receiving N313 consecutive out-of-sync indications from lower layers | Upon receiving N314 consecutive in-sync indications from lower layers for the PSCell, upon initiating the connection re-establishment procedure, upon SCG release and upon receiving *RRCConnectionReconfiguration* including *MobilityControlInfoSCG* | Inform E-UTRAN about the SCG radio link failure by initiating the SCG failure information procedure as specified in 5.6.13. |
| T314NOTE2 | Upon early detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive "early-out-of-sync" indications from lower layers. | Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure and upon initiating the connection re-establishment procedure | Initiate the UE Assistance Information procedure to report early detection of physical layer problems in accordance with 5.6.10. |
| T315NOTE2 | Upon detecting physical layer improvements of the PCell i.e. upon receiving N311 consecutive "early-in-sync" indications from lower layers. | Upon receiving N310 consecutive "early-out-of-sync" indications from lower layers for the PCell. | Initiate the UE Assistance Information procedure to report detection of physical layer improvements in accordance with 5.6.10. |
| T316 | Upon transmission of the *MCGFailureInformation* message | Upon receiving *RRCConnectionRelease*, *RRCConnectionReconfiguration* with *mobilityControlInfo, MobilityFromEUTRACommand*, or upon initiaitng the re-establishment procedure, | Perform the actions as specified in 5.6.26.5. |
| T320 | Upon receiving *t320* or upon cell (re)selection to E-UTRA from another RAT with validity time configured for dedicated priorities (in which case the remaining validity time is applied). | Upon entering RRC\_CONNECTED, when PLMN selection is performed on request by NAS, when the UE enters RRC\_IDLE from RRC\_INACTIVE, or upon cell (re)selection to another RAT (in which case the timer is carried on to the other RAT) , or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR. | Discard the cell reselection priority information provided by dedicated signalling. |
| T321 | Upon receiving *measConfig* including a *reportConfig* with the *purpose* set to *reportCGI* | Upon acquiring the information needed to set all fields of *cellGlobalId* for the requested cell, upon receiving *measConfig* that includes removal of the *reportConfig* with the *purpose* set to *reportCGI* and upon detecting that a cell is not broadcasting SIB1. | Initiate the measurement reporting procedure, stop performing the related measurements and remove the corresponding *measId* |
| T322NOTE1 | Upon receiving *redirectedCarrierOffsetDedicated* included in *RedirectedCarrierInfo* | Upon entering RRC\_CONNECTED, when PLMN selection is performed on request by NAS, or upon cell (re)selection to another frequency or RAT, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR. | Release *redirectedCarrierOffsetDedicated*. |
| T323 | Upon receiving *t323*. | Upon entering RRC\_CONNECTED, when PLMN selection is performed on request by NAS, when the UE enters RRC\_IDLE from RRC\_INACTIVE, or upon cell (re)selection to another RAT, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT or *RRCConnectionRelease* for UP transmission using PUR. | Discard the *altFreqPriorities* provided by dedicated signalling. UE shall apply the cell reselection priority information broadcast in the system information via *cellReselectionPriority* and *cellReselectionSubPriority*. |
| T325 | Timer (re)started upon receiving *RRCConnectionReject* message with *deprioritisationTimer*. |  | Stop deprioritisation of all frequencies or E-UTRA signalled by *RRCConnectionReject.* |
| T330 | Upon receiving *LoggedMeasurementConfiguration* message | Upon log volume exceeding the suitable UE memory, upon initiating the release of *LoggedMeasurementConfiguration* procedure | Perform the actions specified in 5.6.6.4 |
| T331 | Upon receiving *RRCConnectionRelease* message including *measIdleConfig.* | Upon receiving *RRCConnectionSetup, RRCConnectionResume, RRCConnectionRelease* with an idle/inactive measurement configuration or indication to release the configuration, if *validityArea* is configured, upon cell selection/reselection to a cell that does not belong to the *validityArea* (if configured)*,* or upon reselecting to an inter-RAT cell. | Perform the actions specified in 5.6.20.3. |
| T340NOTE2 | Upon transmitting *UEAssistanceInformation* message with *powerPrefIndication* set to *normal* | Upon releasing *powerPrefIndication* during the connection re-establishment procedure | No action. |
| T341NOTE2 | Upon transmitting *UEAssistanceInformation* message with *bw-Preference.* | Upon resuming an RRC connection or upon releasing *bw-Preference* during the connection re-establishment procedure | No action. |
| T342NOTE2 | Upon transmitting *UEAssistanceInformation* message with *delayBudgetReport*. | Upon releasing *delayBudgetReportingConfig* during the connection re-establishment and connection resume procedures | No action. |
| T343NOTE2 | Upon transmitting *UEAssistanceInformation* message with *RLM-Report* including *earlyOutOfSync*. | Upon initiating the connection re-establishment procedure | No action. |
| T344NOTE2 | Upon transmitting *UEAssistanceInformation* message with *RLM-Report* including *earlyInSync*. | Upon initiating the connection re-establishment procedure | No action. |
| T345  | Upon transmitting *UEAssistanceInformation* message with *overheatingAssistance*  | Upon releasing *overheatingAssistance* during the connection re-establishment procedure, or connection resume procedure. | No action. |
| T350 | Upon entering RRC\_IDLE if *t350* has been received in wlan-OffloadInfo. | Upon entering RRC\_CONNECTED, or upon cell reselection. |  Perform the actions specified in 5.6.12.4. |
| T351 | Reception of *RRCConnectionReconfiguration* message including the association*Timer* in *WLAN-MobilityConfig*. | Upon successful connection to WLAN, upon WLAN connection failure, upon leaving RRC\_CONNECTED, upon triggering the handover procedure, or upon initiating the connection re-establishment procedure. | Perform WLAN Connection Status Reporting specified in 5.6.15.2. |
| T360 | Upon performing the redistribution target selection as specified in TS 36.304 [4]. | Upon entering RRC\_CONNECTED, upon receiving a Paging message including *redistributionIndication*; upon reselecting a cell not belonging to the redistribution target. | Stop considering a frequency or cell to be redistribution target, and perform the redistribution target selection if the condition specified in TS 36.304 [4] is met. |
| T370 | Upon receiving *SL-DiscConfig* including a *discSysInfoToReportConfig* set to *setup.* | Upon initiating the transmission of *SidelinkUEInformation* including *discSysInfoReportFreqList*, upon receiving *SL-DiscConfig* including *discSysInfoToReportConfig* set to *release*, upon handover and re-establishment*.* | Release *discSysInfoToReportConfig*. |
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| T380 | Upon reception of *periodic-RNAU-timer* in RRCConnectionRelease. | Upon reception of *RRCConnectionResume*, *RRCConnectionRelease* or *RRCConnectionSetup*. | Initiate the RAN notification area update procedure |
| NOTE1: Only the timers marked with "NOTE1" are applicable to NB-IoT.NOTE2: The behaviour as specified in 7.3.2 applies. |