**3GPP TSG-RAN WG2 Meeting #107bis *R2-1912539***

**Chongqing, China, 14 – 18 Oct 2019**

|  |
| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **36.331** | **CR** | **CRnum** | **rev** | **-** | **Current version:** | **15.6.0** |  |
|  |
| *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)*.* |
|  |

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

|  |
| --- |
|  |
| ***Title:***  | Running CR for 36.331 for CA&DC enh |
|  |  |
| ***Source to WG:*** | Rapporteur (Ericsson) |
| ***Source to TSG:*** | RAN2 |
|  |  |
| ***Work item code:*** | LTE\_NR\_DC\_CA\_enh-Core |  | ***Date:*** | 2019-10-03 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | To capture the RAN2 agreements on LTE\_NR\_DC\_CA\_enh-Core WI:**RAN2#105 agreements**:*Agreements for MCG fast recovery:** MCG failure can be indicated to the network via the SCG. FFS if via SCells.

 **RAN2#105bis agreements**:*Agreements for early measurements:** LTE UE in IDLE mode, IDLE with suspended, and INACTIVE can be configured with NR early measurements to support fast setup of (NG)EN-DC (i.e. euCA is extended to support NR measurements).

*Agreements for MCG fast recovery:** MCG fast recovery targets all MRDC architecture options
* When MCG failure occurs, UE follows SCG failure-like procedure:
* UE does not trigger RRC connection re-establishment.
* UE triggers an MCG failure procedure in which a failure information message is transmitted to the network via SCG.
* MCG fast recovery targets the following use cases MCG leg RLF
* MCG fast recovery can only be triggered after AS security has been activated and the SRB2 and at least one DRB have been setup *(rapporteur note: SCG is not available before AS security has been setup, so this need not be explicitly stated in specification)*
* MCG failure indication should include:
	+ Available measurement results of MCG
	+ MCG link failure cause
	+ Available measurement results of SCG
	+ Available measurement results of non-serving cells
* For MCG failure indication, new RRC message in introduced, e.g. MCGFailureInformation.
* SCG leg of the split SRB1 can be used for MCG fast recovery.

**RAN2#106 agreements**:*Agreements for MCG fast recovery:** Once the MCG failure indication is triggered, the UE shall:- transmit the MCG failure indication;- suspend MCG transmission for all SRBs and DRBs;- reset MCG-MAC;- maintain the current measurement configurations from both the MN and the SN, and continue measurements based on configuration from the MN and the SN if possible..
* If SCG failure is detected while MCG is suspended then initiate RRC re-establishment procedure
* If SCG failure is detected while MCG is suspended then initiate RRC re-establishment procedure
* Upon receiving the MCG failure indication, the MN sends reconfiguration with sync or RRC Release to the UE via SRB1.
* Upon reception of reconfig with sync the UE resumes MCG transmission if suspended

**RAN2#107 agreements***Agreements for early measurements:** For per-frequency SSB measurement configuration reuse the IE structure that is currently used in SIBs for cell reselection purposes.
* The legacy SSB measurement configurations in NR SIB2/4 and LTE SIB24 are reused for NR early measurements performed in frequencies which are candidates of cell selection/reselection, i.e. not introduce new measurement configurations in NR/LTE SIB for these SSBs.
* Same as LTE euCA, NR frequency list (not the SSB measurement configuration) can be different between RRC release and SIB. The frequency list, if provided, in RRC release message overrides the one provided in SIB.
* For per frequency SSB measurement configuration for purpose of only early measurements, it can be included in both RRC release message and SIB. If provided in RRC release message, it overrides the one provided in SIB in the cell where the RRC Release message is received.
* As in LTE euCA, the indication whether to report RSRP, RSRQ or both can be indicated in both RRC release message and SIB. If provided in RRC release, it overrides the one in SIB.
* Similar to LTE euCA, the indication of beam reporting type (i.e. whether to, not report beam results, report only the beam index, or report both beam index and results) can be indicated in both RRC release message and SIB. If provided in RRC release, it overrides the one in SIB.
* NR early measurement configuration is included in a new NR SIB.
* NR early measurement configuration is included in LTE SIB5 (i.e. the SIB including LTE early measurement configurations)
* It is not necessary to specify CSI-RS based early measurements for the case of SCell with SSB in Rel-16.
* It is not necessary to specify CSI-RS based early measurements for the case of SCell without SSB in Rel-16.
* In NR early measurement configuration, the UE can be configured with maximum number for beam reporting and only beams above configured threshold for cell quality derivation are required to be reported (as NR CONNECTED measurements).
* Do not support the network provide information on network’s support of CA/DC between frequencies to assist the UE to determine which frequencies to provide NR early measurement in Rel-16.
* Do not support a mechanism to prevent outdated early measurement reporting in Rel-16
* Upon the reception of the RRCSetup message in response to RRCSetupRequest or RRCResumeRequest (while T331 is running), the UE stops T331, and deletes the dedicated idle mode measurement configuration, if any.
* Upon the reception of the RRCReject message in response to RRCSetupRequest or RRCResumeRequest (while T331 is running), the UE keeps performing the idle mode measurements.
* During a 2-step resume (i.e. RRCRelease in response to RRCResumeRequest), the network can release or reconfigure the idle mode measurements.
* Upon the expiry of T331 while in IDLE or INACTIVE mode, the UE deletes the dedicated idle mode measurement configuration, if any.
* The UE deletes the early measurement results after it has successfully reported them to the network (i.e. in UEInformationResponse or RRCResumeComplete).

*Agreements for MCG SCell and SCG configuraiton with RRC Resume:** The LTE RRCConnectionResume message (Inactive to Connected) can contain the MCG SCell configuration and the associated UE behaviour in handling the SCell configuration is the same as in the Rel-15 RRC connection reconfiguration procedure.
* In NR and LTE Rel-16, the UE maintains the MCG SCell configuration upon the initiation of the resume procedure.
* The RRC(Connection)Resume message contains an indication to restore/resume the MCG SCells (noting that behaviour in legacy eNBs that don't support this feature needs to be considered).
* The (LTE and NR) RRC(Connection)Resume (Inactive to Connected))message can contain the SCG configuration and the associated UE behaviour in handling the SCG configuration is the same as in the Rel-15 RRC (connection) reconfiguration procedure.
* In NR and LTE Rel-16, the UE maintains the SCG configuration upon the initiation of the resume procedure.
* The RRC(Connection)Resume message contains an indication to restore/resume the SCG (noting that behaviour in legacy e/gNBs that don't support this feature needs to be considered).

*Agreements for MCG fast recovery:** Upon sending a MCG failure indication, UE starts a timer.
* Upon resumption of MCG, UE stops the timer.
* Upon expiry of the timer, UE initiates RRC connection re-establishment procedure.
* Network can configure the timer value (no infinite value)
* If a UE is configured with split SRB1 with PDCP duplication, there is no need to switch the primaryPath upon detection of MCG failure since MCG failure indication will be transmitted via SCG RLC bearer of split SRB1.
* If PDCP duplication is not activated, upon detection of MCG failure the primaryPath for split SRB1 is implicitly reconfigured to the SCG. The UE expects the network to explicitly reconfigure the primaryPath back to MCG in the MCG recovery or in a Re-establishment
* SRB3, if configured, can be used for MCG fast recovery.
* For MCG fast recovery via SRB3, MCG Failure Information message in UL (same message as for SRB1 case) is encapsulated by the UE into an SN RRC message.
* For MCG fast recovery via SRB3, the MN response message in DL (either a reconfiguration with sync or release message) is encapsulated by the SN in an SN RRC message.
 |
|  |  |
| ***Summary of change:*** | **After RAN2#105bis:*** Extended ASN.1 signalling of measIdleConfig to include NR measurement configurations (6.3.5)

**After RAN2#106:*** Added that MCG transmission will be resumed on reception RRC connection reconfiguration with mobilityControlInfo (5.3.5.4)
* Modified the SCG change failure procedure, to trigger re-establishement if MCG was suspended (5.3.5.7a)
* Modified the radio link failure detection procedure to trigger MCG failure information procedure on MCG RLF, and trigger re-establishment upon SCG RLF if MCG was suspended (5.3.11.3)
* Clarified that SCG failure information procedure is triggered only if MCG is not suspended (5.6.13.2)
* Added MCG failure information procedure (5.6.x)
* Added the *mcgFailureInformation* message structure in UL-DCCH-Message (6.2.1)
* Added ASN.1 for *MCGFailureInformation* (6.2.2)
* Added NR carrier list in the *varMeasIdleConfig* (7.1)
* Added procedure and ASN.1 for measurement results in *MCGFailureInformation* message (5.6.x, 6.3.5)

**After RAN2#107:*** Modified initiation of RRC Connection Resume procedures to only release MR-DC if UE doesn’t support restoring SCG in connection resumption
* Modified initiation of RRC Connection Resume procedures to only release MCG SCells if UE doesn’t support restoring MCG SCells in *c* connection resumption
* Modified procedures for reception of *RRCConnectionResume* to release MCG SCells if *RRCConnectionResume* doesn’t include *restoreMCG-SCells*
* Modified procedures for reception of *RRCConnectionResume* to release MR-DC if *RRCConnectionResume* doesn’t include *restoreSCG*
* Added procedures to reception of *RRCConnectionResume* to configure MCG SCells with *RRCConnectionResume*
* Added procedures to reception of *RRCConnectionResume* to configure SCG with *RRCConnectionResume*
* Modified the procedure for reception of RRCConnectionReconfiguration that contains the *mobilityControlInfo,* to stop T316, if running and resume MCG transmission, if suspended
* Modified the radio link failure detection procedure, to trigger MCG failure recovery also when SRB3 is configure
* Added a note that the Idle mode measurement procedure needs to be updated to handle rel-16 idle mode measurements
* Updated the MCG fast recovery procedure (setting the measurements, changing the primary path when needed, starting the guard timer, handling of guard timer expiry)
* Modified the ASN.1 for the *MCGFailureInformation* to include the measurement results
* Modified ASN.1 for *RRCConnectionResume* to inlcude indication to restore MCG SCells
* Modified ASN.1 for *RRCConnectionResume* to inlcude indication to restore SCG
* Modified ASN.1 for *RRCConnectionResume* to inlcude configuraitons for MCG SCells
* Modified ASN.1 for *RRCConnectionResume* to inlcude configuraitons for SCG
* Addede FFSs in *RRCConnectionResumeComplete* and *RRCConnectionSetupComplete* if a separate rel-16 idle mode measurement availability indication is needed
* Addede FFS in *UEInformationRequest* if a separate rel-16 idle mode measurement request is needed
* Modified *UEInformationResponse* to include rel-16 idle mode measurement results
* Modified *IdleMeasConfig* to include NR measurement configurations
* Added the *measResultsListIdle* for rel-16 that contains both EUTRA and NR measurement results
* Modified ASN.1 to add UE capability to support keeping MCG SCells during RRC Connection Resume
* Modified ASN.1 to add UE capability to support keeping SCG during RRC Connection Resume
* Added information about MCG fast recovery guard time T316 in the Timers(informative) section
 |
|  |  |
| ***Consequences if not approved:*** |  |
|  |  |
| ***Clauses affected:*** | 5.3.5.4 Reception of an RRCConnectionReconfiguration including the mobilityControlInfo by the UE (handover)5.3.5.7a T307 expiry (SCG change failure)5.3.11.3 Detection of radio link failure5.6.13.2 Initiation (SCG Failure Information)5.6.20 IDLE Mode Measurements5.6.x MCG failure information6.2.1 General message structure (*UL-DCCH-Message*)6.2.2 Message definitions (*MCGFailureInformation*, *RRCConnectionResume*, *RRCConnectionResumeComplete*, *RRCConnectionSetupComplete*, *UEInformationRequest*, *UEInformationResponse*)6.3.5 Measurement information elements (*MeasIdleConfig*, *MeasResults*, *MeasResultMCG-FailureMRDC*)6.3.6 Other information elements (*UE-EUTRA-Capability*)7.1 UE variables (*VarMeasIdleConfig*, *VarMeasIdleReport*) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

START OF CHANGES

# 5 Procedures

## 5.3 Connection control

### 5.3.3 RRC connection establishment

#### 5.3.3.2 Initiation

The UE initiates the procedure when upper layers request establishment or resume of an RRC connection while the UE is in RRC\_IDLE or when upper layers request resume of an RRC connection or RRC layer requests resume of an RRC connection for, e.g. RNAU or reception of RAN paging while the UE is in RRC\_INACTIVE.

Except for NB-IoT, upon initiation of the procedure, if the UE is connected to EPC, the UE shall:

1> if *SystemInformationBlockType2* includes *ac-BarringPerPLMN-List* and the *ac-BarringPerPLMN-List* contains an *AC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):

2> select the *AC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;

2> in the remainder of this procedure, use the selected *AC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in *SystemInformationBlockType2;*

1> else

2> in the remainder of this procedure use the common access barring parameters (i.e. presence or absence of these parameters) included in *SystemInformationBlockType2;*

1> if *SystemInformationBlockType2* contains *acdc-BarringPerPLMN-List* and the *acdc-BarringPerPLMN-List* contains an *ACDC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):

2> select the *ACDC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;

2> in the remainder of this procedure, use the selected *ACDC-BarringPerPLMN* entry for ACDC barring check (i.e. presence or absence of access barring parameters in this entry) irrespective ofthe *acdc-BarringForCommon* parameters included in *SystemInformationBlockType2*;

1> else:

2> in the remainder of this procedure use the *acdc-BarringForCommon* (i.e. presence or absence of these parameters) included in *SystemInformationBlockType2* for ACDC barring check;

1> if upper layers indicate that the RRC connection is subject to EAB (see TS 24.301 [35]):

2> if the result of the EAB check, as specified in 5.3.3.12, is that access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that EAB is applicable, upon which the procedure ends;

1> if upper layers indicate that the RRC connection is subject to ACDC (see TS 24.301 [35]), *SystemInformationBlockType2* contains *BarringPerACDC-CategoryList*, and *acdc-HPLMNonly* indicates that ACDC is applicable for the UE:

2> if the *BarringPerACDC-CategoryList* contains a *BarringPerACDC-Category* entry corresponding to the ACDC category selected by upper layers:

3> select the *BarringPerACDC-Category* entry corresponding to the ACDC category selected by upper layers;

2> else:

3> select the last *BarringPerACDC-Category* entry in the *BarringPerACDC-CategoryList*;

2> stop timer T308, if running;

2> perform access barring check as specified in 5.3.3.13, using T308 as "Tbarring" and *acdc-BarringConfig* in the *BarringPerACDC-Category* as "ACDC barring parameter";

2> if access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring is applicable due to ACDC, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile terminating calls:

2> if timer T302 is running:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile terminating calls is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for emergency calls:

2> if *SystemInformationBlockType2* includes the *ac-BarringInfo*:

3> if the *ac-BarringForEmergency* is set to *TRUE*:

4> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11]:

NOTE 1: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.

5> if the *ac-BarringInfo* includes *ac-BarringForMO-Data*, and for all of these valid Access Classes for the UE, the corresponding bit in the *ac-BarringForSpecialAC* contained in *ac-BarringForMO-Data* is set to *one*:

6> consider access to the cell as barred;

4> else:

5> consider access to the cell as barred;

2> if access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile originating calls:

2> perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and *ac-BarringForMO-Data* as "AC barring parameter";

2> if access to the cell is barred:

3> if *SystemInformationBlockType2* includes *ac-BarringForCSFB* or the UE does not support CS fallback:

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls is applicable, upon which the procedure ends;

3> else (*SystemInformationBlockType2* does not include *ac-BarringForCSFB* and the UE supports CS fallback):

4> if timer T306 is not running, start T306 with the timer value of T303;

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls and mobile originating CS fallback is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile originating signalling:

2> perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and *ac-BarringForMO-Signalling* as "AC barring parameter";

2> if access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating signalling is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile originating CS fallback:

2> if *SystemInformationBlockType2* includes *ac-BarringForCSFB*:

3> perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and *ac-BarringForCSFB* as "AC barring parameter";

3> if access to the cell is barred:

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating CS fallback is applicable, due to *ac-BarringForCSFB*, upon which the procedure ends;

2> else:

3> perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and *ac-BarringForMO-Data* as "AC barring parameter";

3> if access to the cell is barred:

4> if timer T303 is not running, start T303 with the timer value of T306;

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating CS fallback and mobile originating calls is applicable, due to *ac-BarringForMO-Data*, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile originating MMTEL voice, mobile originating MMTEL video, mobile originating SMSoIP or mobile originating SMS:

2> if the UE is establishing the RRC connection for mobile originating MMTEL voice and *SystemInformationBlockType2* includes *ac-BarringSkipForMMTELVoice*; or

2> if the UE is establishing the RRC connection for mobile originating MMTEL video and *SystemInformationBlockType2* includes *ac-BarringSkipForMMTELVideo*; or

2> if the UE is establishing the RRC connection for mobile originating SMSoIP or SMS and *SystemInformationBlockType2* includes *ac-BarringSkipForSMS*:

3> consider access to the cell as not barred;

2> else:

3> if *establishmentCause* received from higher layers is set to *mo-Signalling* (including the case that *mo-Signalling* is replaced by *highPriorityAccess* according to TS 24.301 [35] or by *mo-VoiceCall* according to the subclause 5.3.3.3)*:*

4> perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and *ac-BarringForMO-Signalling* as "AC barring parameter";

4> if access to the cell is barred:

5> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating signalling is applicable, upon which the procedure ends;

3> if *establishmentCause* received from higher layers is set to *mo-Data* (including the case that *mo-Data* is replaced by *highPriorityAccess* according to TS 24.301 [35] or by *mo-VoiceCall* according to the subclause 5.3.3.3):

4> perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and *ac-BarringForMO-Data* as "AC barring parameter";

4> if access to the cell is barred:

5> if *SystemInformationBlockType2* includes *ac-BarringForCSFB* or the UE does not support CS fallback:

6> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls is applicable, upon which the procedure ends;

5> else (*SystemInformationBlockType2* does not include *ac-BarringForCSFB* and the UE supports CS fallback):

6> if timer T306 is not running, start T306 with the timer value of T303;

6> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls and mobile originating CS fallback is applicable, upon which the procedure ends;

Upon initiation of the procedure, if the UE is connected to 5GC, the UE shall:

1> if the upper layers provide an Access Category and one or more Access Identities upon requesting establishment of an RRC connection:

2> perform the unified access control procedure as specified in 5.3.16 using the Access Category and Access Identities provided by upper layers;

3> if the access attempt is barred, the procedure ends;

1> if the resumption of the RRC connection is triggered by response to NG-RAN paging:

2> select '0' as the Access Category;

2> perform the unified access control procedure as specified in 5.3.16 using the selected Access Category and one or more Access Identities provided by upper layers;

3> if the access attempt is barred, the procedure ends;

1> else if the resumption of the RRC connection is triggered by upper layers:

2> if the upper layers provide an Access Category and one or more Access Identities:

3> perform the unified access control procedure as specified in 5.3.16 using the Access Category and Access Identities provided by upper layers;

4> if the access attempt is barred, the procedure ends;

2> set the *resumeCause* in accordance with the information received from upper layers;

1> else if the resumption of the RRC connection is triggered due to an RNAU:

2> if an emergency service is ongoing:

3> select '2' as the Access Category;

3> set the *resumeCause* to *emergency*;

2> else:

3> select '8' as the Access Category;

2> perform the unified access control procedure as specified in 5.3.16 using the selected Access Category and one or more Access Identities to be applied as specified in TS 24.501 [95];

3> if the access attempt is barred:

4> set the variable *pendingRnaUpdate* to 'TRUE';

4> the procedure ends;

Except for NB-IoT, upon initiating the procedure, if connected to EPC or 5GC, the UE shall:

1> if the UE is resuming an RRC connection from a suspended RRC connection or from RRC\_INACTIVE:

2> if the UE was configured with (NG)EN-DC:

3> if the UE does not support maintaining SCG configuration upon connection resumption:

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

2> if the UE does not support maintaining the MCG SCell configurations upon connection resumption:

3> release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;

2> release *powerPrefIndicationConfig*, if configured and stop timer T340, if running;

2> release *reportProximityConfig* and clear any associated proximity status reporting timer;

2> release *obtainLocationConfig*, if configured;

2> release *idc-Config*, if configured;

2> release *sps-AssistanceInfoReport*, if configured;

2> release *measSubframePatternPCell*, if configured;

2> release the entire SCG configuration, if configured, except for the DRB configuration (as configured by *drb-ToAddModListSCG*);

2> release *naics-Info* for the PCell, if configured;

2> release the LWA configuration, if configured, as described in 5.6.14.3;

2> release the LWIP configuration, if configured, as described in 5.6.17.3;

2> release *bw-PreferenceIndicationTimer*, if configured and stop timer T341, if running;

2> release *delayBudgetReportingConfig*, if configured and stop timer T342, if running;

2> release *ailc-BitConfig*, if configured;

2> release *uplinkDataCompression*, if configured;

NOTE 1a: The parameters and configurations are released from the UE Inactive AS context if the UE is resuming an RRC connection from RRC\_INACTIVE.

1> apply the default physical channel configuration as specified in 9.2.4;

1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;

1> apply the default MAC main configuration as specified in 9.2.2;

1> apply the CCCH configuration as specified in 9.1.1.2;

1> apply the *timeAlignmentTimerCommon* included in *SystemInformationBlockType2*;

1> start timer T300;

1> if the UE is resuming an RRC connection from a suspended RRC connection:

2> initiate transmission of the *RRCConnectionResumeRequest* message in accordance with 5.3.3.3a;

1> else if the UE is resuming an RRC connection from RRC\_INACTIVE:

2> stop T380, if running;

2> set the variable *pendingRnaUpdate* to 'FALSE';

2> initiate transmission of the *RRCConnectionResumeRequest* message in accordance with 5.3.3.3a;

1> else:

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

2> if the UE is initiating CP-EDT in accordance with conditions in 5.3.3.1b:

3> initiate transmission of the *RRCEarlyDataRequest* message in accordance with 5.3.3.3b;

2> else:

3> initiate transmission of the *RRCConnectionRequest* message in accordance with 5.3.3.3;

NOTE 2: Upon initiating the connection establishment procedure, the UE is not required to ensure it maintains up to date system information applicable only for UEs in RRC\_IDLE state or UEs in RRC\_INACTIVE. However, the UE needs to perform system information acquisition upon cell re-selection.

For NB-IoT, upon initiation of the procedure, the UE shall:

1> if theUEis establishing or resuming the RRC connection for mobile originating exception data;or

1> if theUEis establishing or resuming the RRC connection for mobile originating data;or

1> if theUEis establishing or resuming the RRC connection for delay tolerant access;or

1> if theUEis establishing or resuming the RRC connection for mobile originating signalling;

2> perform access barring check as specified in 5.3.3.14;

2> if access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring is applicable, upon which the procedure ends;

1> apply the default physical channel configuration as specified in 9.2.4;

1> apply the default MAC main configuration as specified in 9.2.2;

1> apply the CCCH configuration as specified in 9.1.1.2;

1> start timer T300;

1> if the UE is establishing an RRC connection:

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

2> if the UE is initiating CP-EDT in accordance with conditions in 5.3.3.1b:

3> initiate transmission of the *RRCEarlyDataRequest* message in accordance with 5.3.3.3b;

2> else:

3> initiate transmission of the *RRCConnectionRequest* message in accordance with 5.3.3.3;

1> else if the UE is resuming an RRC connection:

2> release *schedulingRequestConfig*, if configured;

2> initiate transmission of the *RRCConnectionResumeRequest* message in accordance with 5.3.3.3a;

NOTE 3: Upon initiating the connection establishment or resumption procedure, the UE is not required to ensure it maintains up to date system information applicable only for UEs in RRC\_IDLE state. However, the UE needs to perform system information acquisition upon cell re-selection.

NOTE 4: For EDT, upon initiating the connection establishment or resumption procedure, it is up to UE implementation whether to continue cell re-selection related measurements as well as cell re-selection evaluation and, if the conditions for cell re-selection are fulfilled, whether to perform cell re-selection as specified in 5.3.3.5.

[…]

#### 5.3.3.3a Actions related to transmission of *RRCConnectionResumeRequest* message

If the UE is resuming the RRC connection from a suspended RRC connection, the UE shall set the contents of *RRCConnectionResumeRequest* message as follows:

1> if the UE is a NB-IoT UE; or

1> if the UE is initiating UP-EDT in accordance with conditions in 5.3.3.1b; or

1> if field *useFullResumeID* is signalled in *SystemInformationBlockType2*:

2> set the *resumeID* to the stored *resumeIdentity*;

1> else:

2> set the *truncatedResumeID* to include bits in bit position 9 to 20 and 29 to 40 from the left in the stored *resumeIdentity*.

1> if the UE supports *mo-VoiceCall* establishment cause and UE is resuming the RRC connection for mobile originating MMTEL voice and *SystemInformationBlockType2* includes *voiceServiceCauseIndication* and the establishment cause received from upper layers is not set to *highPriorityAccess*:

2> set the *resumeCause* to *mo-VoiceCall*;

1> else if the UE supports *mo-VoiceCall* establishment cause for mobile originating MMTEL video and UE is resuming the RRC connection for mobile originating MMTEL video and *SystemInformationBlockType2* includes *videoServiceCauseIndication* and the establishment cause received from upper layers is not set to *highPriorityAccess*:

2> set the *resumeCause* to *mo-VoiceCall*;

1> else:

2> set the *resumeCause* in accordance with the information received from upper layers;

1> set the *shortResumeMAC-I* to the 16 least significant bits of the MAC-I calculated:

2> over the ASN.1 encoded as per clause 8 (i.e., a multiple of 8 bits) *VarShortResumeMAC-Input* (or *VarShortResumeMAC-Input-NB* in NB-IoT);

2> with the KRRCint key and the previously configured integrity protection algorithm; and

2> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;

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

2> if the UE supports DL channel quality reporting and *cqi-Reporting* is present in *SystemInformationBlockType2-NB*:

3> set the *cqi-NPDCCH* to include the latest results of the downlink channel quality measurements of the serving cell as specified in TS 36.133 [16];

NOTE 0: The downlink channel quality measurements may use measurement period T1 or T2, as defined in TS 36.133 [16]. In case period T2 is used the RRC-MAC interactions are left to UE implementation.

2> set *earlyContentionResolution* to TRUE;

1> restore the RRC configuration and security context from the stored UE AS context;

1> if the UE is initiating UP-EDT in accordance with conditions in 5.3.3.1b:

2> restore the PDCP state and re-establish PDCP entities for all SRBs and all DRBs;

2> if *drb-ContinueROHC* has been provided in immediately preceding RRC connection release message, and the UE is requesting to resume RRC connection in the same cell:

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

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

2> else:

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

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

2> resume all SRBs and all DRBs;

2> derive the KeNB key based on the KASME key to which the current KeNB is associated, using the stored value of *nextHopChainingCount* received in the *RRCConnectionRelease* message in the preceding connection, as specified in TS 33.401 [32];

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

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

2> configure lower layers to resume integrity protection using the previously configured algorithm and the KRRCint key derived in this subclause to all subsequent messages received and sent by the UE;

2> configure lower layers to resume ciphering and to apply the ciphering algorithm and the KRRCenc key derived in this subclause to all subsequent messages received and sent by the UE;

2> configure lower layers to resume ciphering and to apply the ciphering algorithm and the KUPenc key derived in this subclause immediately to the user data sent and received by the UE;

2> configure the lower layers to use EDT;

1> else:

2> if SRB1 was configured with NR PDCP:

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

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

2> else:

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

If the UE is resuming the RRC connection from RRC\_INACTIVE, the UE shall set the contents of *RRCConnectionResumeRequest* message as follows:

2> if field *useFullResumeID* is signalled in *SystemInformationBlockType2*:

3> set the *fullI-RNTI* to the stored *fullI-RNTI* value provided in suspend;

2> else:

3> set the *shortI-RNTI* to the stored *shortI-RNTI* value provided in suspend;

2> restore the RRC configuration and the KeNB and KRRCint keys from the UE Inactive AS context except physical layer, MAC configuration and NR *pdcp-Config*;

2> set the *shortResumeMAC-I* to the 16 least significant bits of the MAC-I calculated:

3> over the ASN.1 encoded as per clause 8 (i.e., a multiple of 8 bits) *VarShortINACTIVE-MAC-Input*;

3> with the KRRCint key in the UE Inactive AS Context and the previously configured integrity protection algorithm; and

3> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;

2> derive the KeNB key based on the current KeNB or the NH, using the stored *nextHopChainingCount* value, as specified in TS 33.501 [86];

2> derive the KRRCenc key, the KRRCint and the KUPenc key, as specified in TS 33.501 [86];

2> apply the default configuration for SRB1 as specified in 9.2.1.1;

2> apply the default NR PDCP configuration as specified in TS 38.331 [82], clause 9.2.1 for SRB1;

2> configure lower layers to resume integrity protection for all SRBs except SRB0 using the configured algorithm and the KRRCint key derived in this subclause immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE;

2> configure lower layers to resume ciphering for all radio bearers except SRB0 and to apply the configured ciphering algorithm, the KRRCenc key and the KUPenc key derived in this subclause, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE;

Following procedures are applied for both suspended RRC connection and RRC\_INACTIVE:

2> resume SRB1;

NOTE 2: Until successful connection resumption, the default physical layer configuration and the default MAC Main configuration are applied for the transmission of SRB0 and SRB1, and SRB1 is used only for the transfer of *RRCConnectionResume* message.

The UE shall submit the *RRCConnectionResumeRequest* message to lower layers for transmission.

The UE shall continue cell re-selection related measurements as well as cell re-selection evaluation.

If the UE is resuming the RRC connection from RRC\_INACTIVE and if lower layers indicate an integrity check failure while T300 is running, the UE shall perform actions specified in 5.3.3.16.

[…]

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

The UE shall:

1> stop timer T300;

1> if T309 is running:

2> stop timer T309 for all access categories;

2> perform the actions as specified in 5.3.16.4.

1> stop T380 if running;

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

2> if the *RRCConnectionResume* message does not include the *restoreMCG-SCells*:

3> release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;

2> if the *RRCConnectionResume* message does not include the *restoreSCG*:

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

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

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

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

3> if *drb-ContinueROHC* is included:

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

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

3> else:

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

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

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

2> else if the *RRCConnectionResume* message includes the *fullConfig* (for resuming an RRC connection from RRC\_INACTIVE):

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

2> else (for resuming an RRC connection from RRC\_INACTIVE):

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

3> if *drb-ContinueROHC* is included:

4> indicate to lower layers that *drb-ContinueROHC* is configured;

3> discard the stored UE Inactive AS context;

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

1> else:

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

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

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

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

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

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

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

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

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

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

2> perform SCell release as specified in 5.3.10.3a;

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

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

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

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

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

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

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

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

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

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

1> if T302 is running:

2> stop timer T302;

2> if the UE is connected to 5GC:

3> perform the actions as specified in 5.3.16.4;

1> stop timer T303, if running;

1> stop timer T305, if running;

1> stop timer T306, if running;

1> stop timer T308, if running;

1> perform the actions as specified in 5.3.3.7;

1> stop timer T320, if running;

1> stop timer T350, if running;

1> perform the actions as specified in 5.6.12.4;

1> stop timer T360, if running;

1> stop timer T322, if running;

1> if the *RRCConnectionResume* is received in response to an *RRCConnectionResumeRequest* for EDT or an *RRCConnectionResumeRequest* from RRC\_INACTIVE:

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

1> else:

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

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

3> store the *nextHopChainingCount* value;

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

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

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

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

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

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

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

1> enter RRC\_CONNECTED;

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

1> stop the cell re-selection procedure;

1> consider the current cell to be the PCell;

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

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

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

2> except for NB-IoT:

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

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

5> include rlf-InfoAvailable;

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

5> include logMeasAvailableMBSFN;

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

5> include logMeasAvailable;

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

5> include logMeasAvailableBT;

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

5> include logMeasAvailableWLAN;

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

5> include connEstFailInfoAvailable;

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

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

5> include the *idleMeasAvailable*;

4> stop T331, if running;

4> if the UE has flight path information available:

5> include *flightPathInfoAvailable*;

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

4> include *mobilityHistoryAvail*;

2> for NB-IoT:

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

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

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

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

1> the procedure ends.

### 5.3.5 RRC connection reconfiguration

#### 5.3.5.4 Reception of an *RRCConnectionReconfiguration* including the *mobilityControlInfo* by the UE (handover)

If the *RRCConnectionReconfiguration* message includes the *mobilityControlInfo* and theUE is able to comply with the configuration included in this message, the UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> start timer T304 with the timer value set to *t304,* as included in the *mobilityControlInfo*;

1> stop timer T370, if running;

1> if the *carrierFreq* is included:

2> consider the target PCell to be one on the frequency indicated by the *carrierFreq* with a physical cell identity indicated by the *targetPhysCellId*;

1> else:

2> consider the target PCell to be one on the frequency of the source PCell with a physical cell identity indicated by the *targetPhysCellId*;

1> if T309 is running:

2> stop timer T309 for all access categories;

2> perform the actions as specified in 5.3.16.4.

1> start synchronising to the DL of the target PCell;

NOTE 1: The UE should perform the handover as soon as possible following the reception of the RRC message triggering the handover, which could be before confirming successful reception (HARQ and ARQ) of this message.

1> if BL UE or UE in CE:

2> if *sameSFN-Indication* is not present in *mobilityControlInfo*:

3> acquire the *MasterInformationBlock* in the target PCell;

1> if *makeBeforeBreak* is configured:

2> perform the remainder of this procedure including and following resetting MAC after the UE has stopped the uplink transmission/downlink reception with the source cell(s);

NOTE 1a: It is up to UE implementation when to stop the uplink transmission/ downlink reception with the source cell(s) to initiate re-tuning for connection to the target cell, as specified in TS 36.133 [16], if *makeBeforeBreak* is configured.

1> reset MCG MAC and SCG MAC, if configured;

1> release *uplinkDataCompression*, if configured;

1> re-establish PDCP for all RBs configured with *pdcp-config* that are established;

NOTE 2: The handling of the radio bearers after the successful completion of the PDCP re-establishment, e.g. the re-transmission of unacknowledged PDCP SDUs (as well as the associated status reporting), the handling of the SN and the HFN, is specified in TS 36.323 [8].

NOTE 2a: At handover the *pdcp-reestablish* flag will be set for all RBs configured with NR PDCP in *nr-RadioBearerConfig* TS 38.331 [82] which will cause the PDCP entity to be re-established also for these RBs.

1> re-establish MCG RLC and SCG RLC, if configured, for all RBs that are established;

1> for each SCell configured for the UE other than the PSCell:

2> if the received *RRCConnectionReconfiguration* message includes *sCellState* for the SCell and indicates *activated*:

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

2> else if the received *RRCConnectionReconfiguration* message includes *sCellState* for the SCell and indicates *dormant*:

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

2> else:

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

1> apply the value of the *newUE-Identity* as the C-RNTI;

1> if the *RRCConnectionReconfiguration* message includes the *fullConfig*:

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

1> configure lower layers in accordance with the received *radioResourceConfigCommon*;

1> if the received *RRCConnectionReconfiguration* message includes the *rach-Skip*:

2> configure lower layers to apply the *rach-Skip* for the target MCG, as specified in TS 36.213 [23] and 36.321 [6];

1> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received mobilityControlInfo;

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

2> perform SCell release as specified in 5.3.10.3a;

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

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

1> if the received *RRCConnectionReconfiguration* includes the *scg-Configuration*; or

1> if the current UE configuration includes one or more split DRBs and the received *RRCConnectionReconfiguration* includes *radioResourceConfigDedicated* including *drb-ToAddModList*:

2> perform SCG reconfiguration as specified in 5.3.10.10;

1> if the *RRCConnectionReconfiguration* message includes the *radioResourceConfigDedicated*:

2> perform the radio resource configuration procedure as specified in 5.3.10;

1> if the *securityConfigHO* (without suffix) is included in the *RRCConnectionReconfiguration*:

2> if the *keyChangeIndicator* received in the *securityConfigHO* is set to *TRUE*:

3> update the KeNB key based on the KASME key taken into use with the latest successful NAS SMC procedure, as specified in TS 33.401 [32];

2> else:

3> update the KeNB key based on the current KeNB or the NH, using the *nextHopChainingCount* value indicated in the *securityConfigHO*, as specified in TS 33.401 [32];

NOTE 2b: If the UE needs to update the S-KeNB key as specified in 5.3.10.10, the UE updates the S-KeNB after updating the KeNB key.

2> store the *nextHopChainingCount* value;

2> if the *securityAlgorithmConfig* is included in the *securityConfigHO*:

3> derive the KRRCint key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];

3> if connected as an RN:

4> derive the KUPint key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];

3> derive the KRRCenc key and the KUPenc key associated with the *cipheringAlgorithm*, as specified in TS 33.401 [32];

2> else:

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

3> if connected as an RN:

4> derive the KUPint key associated with the current integrity algorithm, as specified in TS 33.401 [32];

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

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

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

1> else if the *securityConfigHO-v1530* is included in the *RRCConnectionReconfiguration*:

2> if the *nas-Container* is received:

3> forward the *nas-Container* to upper layers;

2> if the *keyChangeIndicator-r15* is received and is set to *TRUE*:

3> update the KeNB key based on the KAMF key, as specified in TS 33.501 [86];

2> else:

3> update the KeNB key based on the current KeNB or the NH, using the received *nextHopChainingCount-r15*, as specified in TS 33.501 [86];

2> store the *nextHopChainingCount-r15* value;

2> if the security*AlgorithmConfig-r15* is received:

3> derive the KRRCint key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];

3> derive the KRRCenc key and the KUPenc key associated with the *cipheringAlgorithm*, as specified in TS 33.401 [32];

2> else:

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

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

1> if the received *RRCConnectionReconfiguration* includes the *nr-Config* and it is set to *release*; or

1> if the received *RRCConnectionReconfiguration* includes *endc-ReleaseAndAdd* and it is set to *TRUE*:

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

1> if the received *RRCConnectionReconfiguration* includes the *sk-Counter*:

2> perform key update procedure as specified in in TS 38.331 [82], clause 5.3.5.7;

1> if the received *RRCConnectionReconfiguration* includes the *nr-SecondaryCellGroupConfig*:

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

1> if the received *RRCConnectionReconfiguration* includes the *nr-RadioBearerConfig1*:

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

1> if the received *RRCConnectionReconfiguration* includes the *nr-RadioBearerConfig2*:

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

1> if connected as an RN:

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

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

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

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

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

1> if the received *RRCConnectionReconfiguration* includes the *systemInformationBlockType1Dedicated*:

2> perfom the actions upon reception of the *SystemInformationBlockType1* message as specified in 5.2.2.7;

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

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

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

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

1> release *reportProximityConfig* and clear any associated proximity status reporting timer;

1> if the *RRCConnectionReconfiguration* message includes the *otherConfig*:

2> perform the other configuration procedure as specified in 5.3.10.9;

1> if the *RRCConnectionReconfiguration* message includes the *sl-DiscConfig* or *sl-CommConfig*:

2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;

1> if the *RRCConnectionReconfiguration* message includes *wlan-OffloadInfo*:

2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;

1> if *handoverWithoutWT-Change* is not configured:

2> release the LWA configuration, if configured, as described in 5.6.14.3;

1> release the LWIP configuration, if configured, as described in 5.6.17.3;

1> if the *RRCConnectionReconfiguration* message includes *rclwi-Configuration*:

2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;

1> if the *RRCConnectionReconfiguration* message includes *lwa-Configuration*:

2> perform the LWA configuration procedure as specified in 5.6.14.2;

1> if the *RRCConnectionReconfiguration* message includes *lwip-Configuration*:

2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;

1> if the *RRCConnectionReconfiguration* message includes the *sl-V2X-ConfigDedicated* or *mobilityControlInfoV2X*:

2> perform the V2X sidelink communication dedicated configuration procedure as specified in 5.3.10.15a;

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

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

3> include *rlf-InfoAvailable*;

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

3> include *logMeasAvailableMBSFN*;

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

3> include the *logMeasAvailable*;

2> if the UE has Bluetooth logged measurements available and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

3> include *logMeasAvailableBT*;

2> if the UE has WLAN logged measurements available and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

3> include *logMeasAvailableWLAN*;

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

3> include *connEstFailInfoAvailable*;

2> if the *RRCConnectionReconfiguration* message includes *perCC-GapIndicationRequest*:

3> include *perCC-GapIndicationList* and *numFreqEffective*;

2> if the frequencies are configured for reduced measurement performance:

3> include *numFreqEffectiveReduced*;

2> if the UE has flight path information available:

3> include *flightPathInfoAvailable*;

2> if the received *RRCConnectionReconfiguration* message included *nr-SecondaryCellGroupConfig*:

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

1> stop timer T316, if running;

1> resume MCG transmission, if suspended;

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

1> if MAC successfully completes the random access procedure; or

1> if MAC indicates the successful reception of a PDCCH transmission addressed to C-RNTI and if *rach-Skip* is configured:

2> stop timer T304;

2> release *rach-Skip*;

2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;

2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

NOTE 3: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

2> if the UE is configured to provide IDC indications:

3> if the UE has transmitted an *InDeviceCoexIndication* message during the last 1 second preceding reception of the *RRCConnectionReconfiguration* message including *mobilityControlInfo*:

4> initiate transmission of the *InDeviceCoexIndication* message in accordance with 5.6.9.3;

2> if the UE is configured to provide power preference indications, overheating assistance information, SPS assistance information, delay budget report or maximum bandwidth preference indications:

3> if the UE has transmitted a *UEAssistanceInformation* message during the last 1 second preceding reception of the *RRCConnectionReconfiguration* message including *mobilityControlInfo*:

4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;

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

3> if the UE has transmitted a *MBMSInterestIndication* message during the last 1 second preceding reception of the *RRCConnectionReconfiguration* message including *mobilityControlInfo*:

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

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

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

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

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

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

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

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

2> the procedure ends;

NOTE 4: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell, except for BL UEs or UEs in CE when *sameSFN-Indication* is not present in *mobilityControlInfo*.

END OF CHANGES

START OF CHANGES

#### 5.3.5.7a T307 expiry (SCG change failure)

The UE shall:

1> if T307 expires:

NOTE 1: Following T307 expiry any dedicated preamble, if provided within the *rach-ConfigDedicatedSCG*, is not available for use by the UE anymore.

2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG change failure;

END OF CHANGES

START OF CHANGES

### 5.3.7 RRC connection re-establishment

#### 5.3.7.2 Initiation

The UE shall only initiate the procedure either when AS security has been activated or for a NB-IoT UE supporting RRC connection re-establishment for the Control Plane CIoT EPS optimisation. The UE initiates the procedure when one of the following conditions is met:

1> upon detecting radio link failure, in accordance with 5.3.11; or

1> upon handover failure, in accordance with 5.3.5.6; or

1> upon mobility from E-UTRA failure, in accordance with 5.4.3.5; or

1> except for UP-EDT, upon integrity check failure indication from lower layers concerning SRB1 or SRB2; or

1> upon an RRC connection reconfiguration failure, in accordance with 5.3.5.5; or

1> upon an RRC connection reconfiguration failure, in accordance with TS38.331 [82], clause 5.3.5.5;

1> upon detecting radio link failure for the SCG while MCG is suspended, in accordance with TS 38.331 [82] subclause 5.3.10.3;

1> upon SCG change failure while MCG is suspended, in accordance with TS 38.331 [82] subclause 5.3.5.8.3;

1> upon SCG configuration failure while MCG is suspended in accordance with subclause TS 38.331 [82] subclause 5.3.5.8.2;

1> upon integrity check failure indication from SCG lower layers concerning SRB3 while MCG is suspended.

NOTE: For UP-EDT, integrity check failure indication from lower layers is handled in accordance with subclause 5.3.3.16.

Upon initiation of the procedure, the UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> stop timer T313, if running;

1> stop timer T307, if running;

1> stop timer T316, if running;

1> start timer T311;

1> stop timer T370, if running;

1> release *uplinkDataCompression*, if configured;

1> suspend all RBs, including RBs configured with NR PDCP, except SRB0;

1> reset MAC;

1> release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;

1> release the SCell group(s), if configured, in accordance with 5.3.10.3d;

1> apply the default physical channel configuration as specified in 9.2.4;

1> except for NB-IoT, for the MCG, apply the default semi-persistent scheduling configuration as specified in 9.2.3;

1> for NB-IoT, release *schedulingRequestConfig*, if configured;

1> for the MCG, apply the default MAC main configuration as specified in 9.2.2;

1> release *powerPrefIndicationConfig*, if configured and stop timer T340, if running;

1> release *reportProximityConfig*, if configured and clear any associated proximity status reporting timer;

1> release *obtainLocationConfig*, if configured;

1> release *idc-Config*, if configured;

1> release *sps-AssistanceInfoReport*, if configured;

1> release *measSubframePatternPCell*, if configured;

1> release the entire SCG configuration, if configured, except for the DRB configuration (as configured by *drb-ToAddModListSCG*);

1> if (NG)EN-DC is configured:

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

2> release *p-MaxEUTRA*, if configured;

2> release *p-MaxUE-FR1*, if configured;

2> release *tdm-PatternConfig*, if configured;

1> release *naics-Info* for the PCell, if configured;

1> if connected as an RN and configured with an RN subframe configuration:

2> release the RN subframe configuration;

1> release the LWA configuration, if configured, as described in 5.6.14.3;

1> release the LWIP configuration, if configured, as described in 5.6.17.3;

1> release *delayBudgetReportingConfig*, if configured and stop timer T342, if running;

1> perform cell selection in accordance with the cell selection process as specified in TS 36.304 [4];

1> release *bw-PreferenceIndicationTimer*, if configured and stop timer T341, if running;

1> release *overheatingAssistanceConfig*, if configured and stop timer T345, if running;

1> release *ailc-BitConfig*, if configured;

END OF CHANGES

START OF CHANGES

### 5.3.11 Radio link failure related actions

#### 5.3.11.3 Detection of radio link failure

The UE shall:

1> upon T310 expiry; or

1> upon T312 expiry; or

1> upon random access problem indication from MCG MAC while neither T300, T301, T304 nor T311 is running; or

1> upon indication from MCG RLC, which is allowed to be send on PCell, that the maximum number of retransmissions has been reached for an SRB or DRB:

2> if UE is configured with (NG)EN-DC, split SRB1 or SRB3 is configured and SCG is not suspended and NR PSCell change is not ongoing (i.e. t304 for the NR PSCell is not running as specified in TS 38.331 [82], clause 5.3.5.5.2 in case of (NG)EN-DC):

3> initiate the MCG failure information procedure as specified in 5.6.x to report MCG radio link failure.

2> else:

3> consider radio link failure to be detected for the MCG , i.e. RLF;

3> except for NB-IoT, store the following radio link failure information in the *VarRLF-Report* by setting its fields as follows:

4> clear the information included in *VarRLF-Report*, if any;

4> set the *plmn-IdentityList* to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);

4> set the *measResultLastServCell* to include the RSRP and RSRQ, if available, of the PCell based on measurements collected up to the moment the UE detected radio link failure;

4> set the *measResultNeighCells* to include the best measured cells, other than the PCell, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected radio link failure, and set its fields as follows;

5> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the *measResultListEUTRA*;

5> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the *measResultListUTRA*;

5> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN frequencies, include the *measResultListGERAN*;

5> if the UE was configured to perform measurement reporting for one or more neighbouring CDMA2000 frequencies, include the *measResultsCDMA2000*;

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

NOTE 1: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

4> if available, set the *logMeasResultListWLAN* to include the WLAN measurement results, in order of decreasing RSSI for WLAN APs;

4> if available, set the *logMeasResultListBT* to include the Bluetooth measurement results, in order of decreasing RSSI for Bluetooth beacons;

4> if detailed location information is available, set the content of the *locationInfo* as follows:

5> include the locationCoordinates;

5> include the horizontalVelocity, if available;

4> set the *failedPCellId* to the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of the PCell where radio link failure is detected;

4> set the *tac-FailedPCell* to the tracking area code, if available, of the PCell where radio link failure is detected;

4> if an *RRCConnectionReconfiguration* message including the *mobilityControlInfo* was received before the connection failure:

5> if the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo* concerned an intra E-UTRA handover:

6> include the *previousPCellId* and set it to the global cell identity of the PCell where the last *RRCConnectionReconfiguration* message including *mobilityControlInfo* was received;

6> set the *timeConnFailure* to the elapsed time since reception of the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo*;

5> if the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo* concerned a handover to E-UTRA from UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO:

6> include the *previousUTRA-CellId* and set it to the physical cell identity, the carrier frequency and the global cell identity, if available, of the UTRA Cell in which the last *RRCConnectionReconfiguration* message including *mobilityControlInfo* was received;

6> set the *timeConnFailure* to the elapsed time since reception of the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo*;

4> if the UE supports QCI1 indication in Radio Link Failure Report and has a DRB for which QCI is 1:

5> include the drb-EstablishedWithQCI-1;

4> set the connectionFailureType to rlf;

4> set the c-RNTI to the C-RNTI used in the PCell;

4> set the rlf-Cause to the trigger for detecting radio link failure;

3> if AS security has not been activated:

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

5> if the UE supports RRC connection re-establishment for the Control Plane CIoT EPS optimisation:

6> initiate the RRC connection re-establishment procedure as specified in 5.3.7;

5> else:

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

4> else:

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

3> else:

4> initiate the connection re-establishment procedure as specified in 5.3.7;

In case of DC or NE-DC, the UE shall:

1> upon T313 expiry; or

1> upon random access problem indication from SCG MAC; or

1> upon indication from SCG RLC, which is allowed to be sent on PSCell, that the maximum number of retransmissions has been reached for an SCG, for a split DRB or for a split SRB:

2> if the UE is configured with DC; or

2> if the UE is configured with NE-DC and MCG transmission is not suspended:

3> consider radio link failure to be detected for the SCG i.e. SCG-RLF;

3> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG radio link failure;

2> else:

3> consider radio link failure to be detected for the MCG and SCG i.e. RLF;

3> initiate the connection re-establishment procedure as specified in TS 38.331 [82] 5.3.7;

In case of CA PDCP duplication, the UE shall:

1> upon indication from an RLC entity, which is restricted to be sent on SCell only, that the maximum number of retransmissions has been reached:

2> initiate the failure information procedure as specified in 5.6.21 to report RLC failure of type duplication;

The UE may discard the radio link failure information, i.e. release the UE variable *VarRLF-Report*, 48 hours after the radio link failure is detected, upon power off or upon detach.

END OF CHANGES

START OF CHANGES

## 5.6 Other

### 5.6.13 SCG failure information

#### 5.6.13.2 Initiation

A UE initiates the procedure to report SCG failures when neither MCG nor SCG transmission is suspended and when one of the following conditions is met:

1> upon detecting radio link failure for the SCG, in accordance with 5.3.11; or

1> upon SCG change failure, in accordance with 5.3.5.7a; or

1> upon stopping uplink transmission towards the PSCell due to exceeding the maximum uplink transmission timing difference when *powerControlMode* is configured to 1, in accordance with subclause 7.17.2 of TS 36.133 [29].

In case of DC, upon initiating the procedure, the UE shall:

1> suspend all SCG DRBs and suspend SCG transmission for split DRBs;

1> reset SCG-MAC;

1> stop T307;

1> if the UE is configured with NE-DC:

2> initiate transmission of the *SCGFailureInformationEUTRA* message via the NR MCG as specified in TS 38.331 [82], clause 5.7.3a;

1> else:

2> initiate transmission of the *SCGFailureInformation* message in accordance with 5.6.13.3;

END OF CHANGES

START OF CHANGES

### 5.6.20 Idle/inactive Measurements

#### 5.6.20.1 General

This procedure specifies the measurements done by a UE in RRC\_IDLE or RRC\_INACTIVE when it has an idle/inactive measurement configuration and the storage of the available measurements by a UE in RRC\_IDLE, RRC\_INACTIVE and RRC\_CONNECTED.

Editor’s Note: To be updated with the Rel-16 idle/inactive measurement procedures.

#### 5.6.20.2 Initiation

While T331 is running, the UE shall:

1> perform the measurements in accordance with the following:

2> for each entry in *measIdleCarrierListEUTRA* within *VarMeasIdleConfig*:

3> if UE supports carrier aggregation between serving carrier and the carrier frequency and bandwidth indicated by *carrierFreq* and *allowedMeasBandwidth* within the corresponding entry;

4> perform measurements in the carrier frequency and bandwidth indicated by *carrierFreq* and *allowedMeasBandwidth* within the corresponding entry;

NOTE: The fields *s-NonIntraSearch* in *SystemInformationBlockType3* do not affect the idle/inactive UE measurement procedures. How the UE performs idle/inactive measurements is up to UE implementation as long as the requirements in TS 36.133 [16] are met for measurement reporting. UE is not required to perform idle/inactive measurements if the SIB2 does not contain *idleModeMeasurements*.

4> if the *measCellList* is included:

5> consider the serving cell and cells identified by each entry within the *measCellList* to be applicable for idle/inactive measurement reporting;

4> else:

5> consider the serving cell and up to *maxCellMeasIdle* strongest identified cells whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThreshold* (if any) to be applicable for idle/inactive measurement reporting;

4> store measurement results for cells applicable for idle/inactive measurement reporting within the *VarMeasIdleReport*;

3> else:

4> do not consider the carrier frequency to be applicable for idle/inactive measurement reporting;

1> if *validityArea* is configured in *VarMeasIdleConfig* and UE reselects to a serving cell whose physical cell identity does not match any entry in *validityArea* for the corresponding carrier frequency:

2> stop T331;

#### 5.6.20.3 T331 expiry or stop

The UE shall:

1> if T331 expires or is stopped:

2> release the *VarMeasIdleConfig*;

NOTE: It is up to UE implementation whether to continue idle/inactive measurements according to SIB5 configuration after T331 has expired or stopped.

END OF CHANGES

START OF CHANGES

### 5.6.x MCG failure information

#### 5.6.x.1 General

****

**Figure 5.6.x.1-x: MCG failure information**

The purpose of this procedure is to inform E-UTRAN MN about an MCG failure the UE has experienced i.e. MCG radio link failure. A UE in RRC\_CONNECTED, for which AS security has been activated with SRB2 and at least one DRB setup, may initiate the procedure in order to continue the RRC connection without re-establishment.

#### 5.6.x.2 Initiation

A UE configured with split SRB1 or SRB3 initiates the procedure to report MCG failures when neither MCG nor SCG transmission is suspended and when the following condition is met:

1> upon detecting radio link failure of the MCG, in accordance with 5.3.11;

Upon initiating the procedure, the UE shall:

1> suspend MCG transmission for all SRBs and DRBs;

1. reset MCG-MAC;

1> initiate transmission of the *MCGFailureInformation* message in accordance with 5.6.x.5.

#### 5.6.x.3 Failure type determination

The UE shall set the MCG failure type as follows:

1> if the UE initiates transmission of the *MCGFailureInformation* message due to T310 expiry:

2> set the *failureType* as *t310-Expiry*;

1> else if the UE initiates transmission of the *MCGFailureInformation* message to provide random access problem indication from MCG MAC:

2> set the *failureType* as *randomAccessProblem*;

1> else if the UE initiates transmission of the *MCGFailureInformation* message to provide indication from MCG RLC that the maximum number of retransmissions has been reached:

2> set the *failureType* as *rlc-MaxNumRetx*;

#### 5.6.x.4 Actions related to transmission of *MCGFailureInformation* message

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

1> include and set *failureType* in accordance with 5.6.x.3;

1> for each measObjectEUTRA for which a measId is configured and for which measurement results are available;

2> include an entry in measResultsFreqListEUTRA;

2> if a serving cell is associated with the MeasObjectEUTRA:

3> set measResultServingCell to include the available quantities of the concerned cell and in accordance with the performance requirements in TS 36.133 [16];

2> set the measResultNeighCellList to include the best measured cells, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows;

3> ordering the cells with sorting as follows:

4> using RSRP if RSRP measurement results are available, otherwise using RSRQ if RSRQ measurement results are available, otherwise using SINR;

3> for each neighbour cell included:

4> include the optional fields for which measurement results are available;

NOTE: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

1> for each NR frequency the UE is configured to measure by measConfig for which measurement results are available:

2> set the measResultFreqListNR to include the best measured cells, ordered such that the best cell is listed first using RSRP to order if RSRP measurement results are available for cells on this frequency, otherwise using RSRQ to order if RSRQ measurement results are available for cells on this frequency, otherwise using SINR to order, and based on measurements collected up to the moment the UE detected the failure, and for each cell that is included, include the optional fields that are available;

1> include and set *measResultSCG* in accordance with TS 38.331 [82], clause 5.7.3.4:

NOTE: Field *measResultSCG* is used to report available results for NR frequencies the UE is configured to measure by NR RRC signalling.1> if SRB1 is configured as split SRB and *pdcp-Duplication* is not configured in accordance with TS 38.331 [82, 6.3.2];

2> if *primaryPath* is set to MCG;

3> set *primaryPath* to SCG;

Editor’s note: FFS How to capture sending of *MCGFailureInformation* via SRB3

The UE shall:

1. start timer T316;

1> submit the *MCGFailureInformation* message to lower layers for transmission.

#### 5.6.x.5 T316 expiry

The UE shall:

1> if T316 expires:

2> initiate the connection re-establishment procedure as specified in 5.3.7.

END OF CHANGES

START OF CHANGES

# 6 Protocol data units, formats and parameters (tabular & ASN.1)

[…]

## 6.2.1 General message structure

[…]

#### – *UL-DCCH-Message*

The *UL-DCCH-Message* class is the set of RRC messages that may be sent from the UE to the E‑UTRAN or from the RN to the E-UTRAN on the uplink DCCH logical channel.

-- ASN1START

UL-DCCH-Message ::= SEQUENCE {

 message UL-DCCH-MessageType

}

UL-DCCH-MessageType ::= CHOICE {

 c1 CHOICE {

 csfbParametersRequestCDMA2000 CSFBParametersRequestCDMA2000,

 measurementReport MeasurementReport,

 rrcConnectionReconfigurationComplete RRCConnectionReconfigurationComplete,

 rrcConnectionReestablishmentComplete RRCConnectionReestablishmentComplete,

 rrcConnectionSetupComplete RRCConnectionSetupComplete,

 securityModeComplete SecurityModeComplete,

 securityModeFailure SecurityModeFailure,

 ueCapabilityInformation UECapabilityInformation,

 ulHandoverPreparationTransfer ULHandoverPreparationTransfer,

 ulInformationTransfer ULInformationTransfer,

 counterCheckResponse CounterCheckResponse,

 ueInformationResponse-r9 UEInformationResponse-r9,

 proximityIndication-r9 ProximityIndication-r9,

 rnReconfigurationComplete-r10 RNReconfigurationComplete-r10,

 mbmsCountingResponse-r10 MBMSCountingResponse-r10,

 interFreqRSTDMeasurementIndication-r10 InterFreqRSTDMeasurementIndication-r10

 },

 messageClassExtension CHOICE {

 c2 CHOICE {

 ueAssistanceInformation-r11 UEAssistanceInformation-r11,

 inDeviceCoexIndication-r11 InDeviceCoexIndication-r11,

 mbmsInterestIndication-r11 MBMSInterestIndication-r11,

 scgFailureInformation-r12 SCGFailureInformation-r12,

 sidelinkUEInformation-r12 SidelinkUEInformation-r12,

 wlanConnectionStatusReport-r13 WLANConnectionStatusReport-r13,

 rrcConnectionResumeComplete-r13 RRCConnectionResumeComplete-r13,

 ulInformationTransferMRDC-r15 ULInformationTransferMRDC-r15,

 scgFailureInformationNR-r15 SCGFailureInformationNR-r15,

 measReportAppLayer-r15 MeasReportAppLayer-r15,

 failureInformation-r15 FailureInformation-r15,

 mcgFailureInformation-r16 MCGFailureInformation-r16,

 spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL

 },

 messageClassExtensionFuture-r11 SEQUENCE {}

 }

}

-- ASN1STOP

END OF CHANGES

START OF CHANGES

### 6.2.2 Message definitions

[…]

#### – *MCGFailureInformation*

The *MCGFailureInformation* message is used to provide information regarding NR MCG failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

***MCGFailureInformation* message**

-- ASN1START

MCGFailureInformation-r16 ::= SEQUENCE {

 criticalExtensions CHOICE {

 mcgFailureInformation MCGFailureInformation-r16-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

MCGFailureInformation-r16-IEs ::= SEQUENCE {

 failureReportMCG FailureReportMCG OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

FailureReportMCG ::= SEQUENCE {

 failureType ENUMERATED {

 t310-Expiry, randomAccessProblem,

 rlc-MaxNumRetx, spare},

 measResultFreqListEUTRA MeasResultList3EUTRA-r15 OPTIONAL,

 measResultFreqListNR MeasResultFreqListFailNR-r15 OPTIONAL,

 measResultSCG-FailureMRDC OCTET-STRING OPTIONAL,

 ...

}

-- ASN1STOP

| ***MCGFailureInformation field descriptions*** |
| --- |
|  |
| ***measResultFreqListEUTRA***The field contains available results of measurements on EUTRA frequencies the UE is configured to measure by *measConfig*. |
| ***measResultFreqListNR***The field contains available results of measurements on NR frequencies the UE is configured to measure by *measConfig*. |
| ***measResultSCG***Includes the NR *MeasResultSCG-Failure* IE as specified in TS 38.331 [82]. The field contains available results of measurements on NR frequencies the UE is configured to measure by the NR RRCConfiguration 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-v16xx-IEs OPTIONAL

}

RRCConnectionResume-v16xx-IEs ::= SEQUENCE {

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

 restoreSCG ENUMERATED {true} OPTIONAL, -- Need ON

 sCellToAddModList-r16 FFS-Value OPTIONAL, -- Need ON

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

 nr-secondaryCellGroupConfig OCTET STRING OPTIONAL, -- Need ON

 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 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. |
| ***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* 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, if configured. |
| **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. |

[…]

#### – *RRCConnectionResumeComplete*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionResumeComplete* message

-- ASN1START

RRCConnectionResumeComplete-r13 ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcConnectionResumeComplete-r13 RRCConnectionResumeComplete-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionResumeComplete-r13-IEs ::= SEQUENCE {

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

 dedicatedInfoNAS-r13 DedicatedInfoNAS OPTIONAL,

 rlf-InfoAvailable-r13 ENUMERATED {true} OPTIONAL,

 logMeasAvailable-r13 ENUMERATED {true} OPTIONAL,

 connEstFailInfoAvailable-r13 ENUMERATED {true} OPTIONAL,

 mobilityState-r13 ENUMERATED {normal, medium, high, spare} OPTIONAL,

 mobilityHistoryAvail-r13 ENUMERATED {true} OPTIONAL,

 logMeasAvailableMBSFN-r13 ENUMERATED {true} OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-v1530-IEs OPTIONAL

}

RRCConnectionResumeComplete-v1530-IEs ::= SEQUENCE {

 logMeasAvailableBT-r15 ENUMERATED {true} OPTIONAL,

 logMeasAvailableWLAN-r15 ENUMERATED {true} OPTIONAL,

 idleMeasAvailable-r15 ENUMERATED {true} OPTIONAL,

 flightPathInfoAvailable-r15 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

Editor’s Note: FFS whether to have a separate availability indicator for rel-16 idle/inactive measurements.

-- ASN1STOP

| *RRCConnectionResumeComplete* field descriptions |
| --- |
| ***idleMeasAvailable***Indication that the UE has idle/inactive measurement report available. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in SIB1. 1 if the 1st PLMN is selected from the 1st *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList,* then the PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on. The *selectedPLMN-Identity* is referred to the PLMN list for 5GC if the UE is in RRC\_INACTIVE state. |

[…]

#### – *RRCConnectionSetupComplete*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionSetupComplete message*

-- ASN1START

RRCConnectionSetupComplete ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 c1 CHOICE{

 rrcConnectionSetupComplete-r8 RRCConnectionSetupComplete-r8-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {

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

 registeredMME RegisteredMME OPTIONAL,

 dedicatedInfoNAS DedicatedInfoNAS,

 nonCriticalExtension RRCConnectionSetupComplete-v8a0-IEs OPTIONAL

}

RRCConnectionSetupComplete-v8a0-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1020-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1020-IEs ::= SEQUENCE {

 gummei-Type-r10 ENUMERATED {native, mapped} OPTIONAL,

 rlf-InfoAvailable-r10 ENUMERATED {true} OPTIONAL,

 logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,

 rn-SubframeConfigReq-r10 ENUMERATED {required, notRequired} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1130-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1130-IEs ::= SEQUENCE {

 connEstFailInfoAvailable-r11 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1250-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1250-IEs ::= SEQUENCE {

 mobilityState-r12 ENUMERATED {normal, medium, high, spare} OPTIONAL,

 mobilityHistoryAvail-r12 ENUMERATED {true} OPTIONAL,

 logMeasAvailableMBSFN-r12 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1320-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1320-IEs ::= SEQUENCE {

 ce-ModeB-r13 ENUMERATED {supported} OPTIONAL,

 s-TMSI-r13 S-TMSI OPTIONAL,

 attachWithoutPDN-Connectivity-r13 ENUMERATED {true} OPTIONAL,

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

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

 nonCriticalExtension RRCConnectionSetupComplete-v1330-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1330-IEs ::= SEQUENCE {

 ue-CE-NeedULGaps-r13 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1430-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1430-IEs ::= SEQUENCE {

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

 nonCriticalExtension RRCConnectionSetupComplete-v1530-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1530-IEs ::= SEQUENCE {

 logMeasAvailableBT-r15 ENUMERATED {true} OPTIONAL,

 logMeasAvailableWLAN-r15 ENUMERATED {true} OPTIONAL,

 idleMeasAvailable-r15 ENUMERATED {true} OPTIONAL,

 flightPathInfoAvailable-r15 ENUMERATED {true} OPTIONAL,

 connectTo5GC-r15 ENUMERATED {true} OPTIONAL,

 registeredAMF-r15 RegisteredAMF-r15 OPTIONAL,

 s-NSSAI-list-r15 SEQUENCE(SIZE (1..maxNrofS-NSSAI-r15)) OF S-NSSAI-r15 OPTIONAL,

 ng-5G-S-TMSI-Bits-r15 CHOICE {

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

 ng-5G-S-TMSI-Part2-r15 BIT STRING (SIZE (8))

 } OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1540-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1540-IEs ::= SEQUENCE {

 gummei-Type-v1540 ENUMERATED {mappedFrom5G} OPTIONAL,

 guami-Type-r15 ENUMERATED {native, mapped} OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

Editor’s Note: FFS whether to have a separate availability indicator for rel-16 idle/inactive measurements.

RegisteredMME ::= SEQUENCE {

 plmn-Identity PLMN-Identity OPTIONAL,

 mmegi BIT STRING (SIZE (16)),

 mmec MMEC

}

RegisteredAMF-r15 ::= SEQUENCE {

 plmn-Identity-r15 PLMN-Identity OPTIONAL,

 amf-Identifier-r15 AMF-Identifier-r15

}

-- ASN1STOP

| *RRCConnectionSetupComplete* field descriptions |
| --- |
| ***attachWithoutPDN-Connectivity***This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers and specified in TS 24.301 [35]. |
| ***cp-CIoT-EPS-Optimisation***This field is included when the UE supports the Control plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35]. |
| ***ce-ModeB***Indicates whether the UE supports operation in CE mode B, as specified in TS 36.306 [5]. |
| ***connectTo5GC***This field is not used in the specification. It shall not be sent by the UE. |
| ***dcn-ID***The Dedicated Core Network Identity, see TS 23.401 [41]. |
| ***guami-Type***This field is used to indicate whether the GUAMI included is native (derived from native 5G-GUTI) or mapped (from EPS, derived from EPS GUTI) as specified in TS 24.501 [95]. |
| ***gummei-Type***This field is used to indicate whether the GUMMEI included is native (assigned by EPC) or mapped. The value native indicates the GUMMEI is native, mapped indicates the GUMMEI is mapped from 2G/3G identifiers, and mappedFrom5G indicates the GUMMEI is mapped from 5G identifiers. A UE that sets *gummei-Type-v1540* to mappedFrom5G shall also include *gummei-Type-r10* and set it to native. |
| ***idleMeasAvailable***Indication that the UE has idle/inactive measurement report available. |
| ***mmegi***Provides the Group Identity of the registered MME within the PLMN, as provided by upper layers, see TS 23.003 [27]. |
| ***mobilityState***This field indicates the UE mobility state (as defined in TS 36.304 [4], clause 5.2.4.3) just prior to UE going into RRC\_CONNECTED state. The UE indicates the value of *medium* and *high* when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value *normal*. |
| ***ng-5G-S-TMSI-Part2***The leftmost 8 bits of 5G-S-TMSI. |
| ***registeredAMF***This field is used to transfer the GUAMI of the AMF where the UE is registered, as provided by upper layers, see TS 23.003 [27]. |
| ***registeredMME***This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers. |
| ***rn-SubframeConfigReq***If present, this field indicates that the connection establishment is for an RN and whether a subframe configuration is requested or not. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in SIB1. 1 if the 1st PLMN is selected from the 1st *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList*, then the PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on. |
| ***s-NSSAI-List***This field is a list of S-NSSAI as indicated by the upper layers. The UE can report up to eight S-NSSAI per NSSAI, see TS 23.003 [27]. |
| ***ue-CE-NeedULGaps***Indicates whether the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5]. |
| ***up-CIoT-EPS-Optimisation***This field is included when the UE supports the User plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35]. |

[…]

#### – *UEInformationRequest*

The *UEInformationRequest* is the command used by E-UTRAN to retrieve information from the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E‑UTRAN to UE

*UEInformationRequest message*

-- ASN1START

UEInformationRequest-r9 ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 c1 CHOICE {

 ueInformationRequest-r9 UEInformationRequest-r9-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

UEInformationRequest-r9-IEs ::= SEQUENCE {

 rach-ReportReq-r9 BOOLEAN,

 rlf-ReportReq-r9 BOOLEAN,

 nonCriticalExtension UEInformationRequest-v930-IEs OPTIONAL

}

UEInformationRequest-v930-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UEInformationRequest-v1020-IEs OPTIONAL

}

UEInformationRequest-v1020-IEs ::= SEQUENCE {

 logMeasReportReq-r10 ENUMERATED {true} OPTIONAL, -- Need ON

 nonCriticalExtension UEInformationRequest-v1130-IEs OPTIONAL

}

UEInformationRequest-v1130-IEs ::= SEQUENCE {

 connEstFailReportReq-r11 ENUMERATED {true} OPTIONAL, -- Need ON

 nonCriticalExtension UEInformationRequest-v1250-IEs OPTIONAL

}

UEInformationRequest-v1250-IEs ::= SEQUENCE {

 mobilityHistoryReportReq-r12 ENUMERATED {true} OPTIONAL, -- Need ON

 nonCriticalExtension UEInformationRequest-v1530-IEs OPTIONAL

}

UEInformationRequest-v1530-IEs ::= SEQUENCE {

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

 flightPathInfoReq-r15 FlightPathInfoReportConfig-r15 OPTIONAL, -- Need ON

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

Editor’s Note: FFS whether to have a separate rel-16 idle/inactive measurement request or the idleModeMeasurementReq-r15 can be reused for rel-16 as well.

-- ASN1STOP

| *UEInformationRequest* field descriptions |
| --- |
| ***rach-ReportReq***This field is used to indicate whether the UE shall report information about the random access procedure. |

#### – *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 SEQUENCE {

 numberOfPreamblesSent-r9 NumberOfPreamblesSent-r11,

 contentionDetected-r9 BOOLEAN

 } 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-v16xx-IEs OPTIONAL

}

UEInformationResponse-v16xx-IEs ::= SEQUENCE {

 measResultListIdle-r16 MeasResultListIdle-r16 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

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

 ]]

}

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

 ]]

}

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

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

 ]]

}

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

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

MobilityHistoryReport-r12 ::= VisitedCellInfoList-r12

FlightPathInfoReport-r15 ::= SEQUENCE {

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

 nonCriticalExtension 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. |
| ***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]. |
| ***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. |
| ***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 measurement results done during RRC\_IDLE and RRC\_INACTIVE at network request. |
| ***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 *RRC-Connection-Reconfiguration* 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. |
| ***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. |
| ***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. |

END OF CHANGES

START OF CHANGES

### 6.3.5 Measurement information elements

#### – *MeasIdleConfig*

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

*MeasIdleConfig* information element

-- ASN1START

MeasIdleConfigSIB-r15 ::= SEQUENCE {

 measIdleCarrierListEUTRA-r15 EUTRA-CarrierList-r15,

 ...,

 [[

 measIdleCarrierListNR-r16 NR-CarrierList-r16 OPTIONAL, -- Need OR

 ]]

}

MeasIdleConfigDedicated-r15 ::= SEQUENCE {

 measIdleCarrierListEUTRA-r15 EUTRA-CarrierList-r15 OPTIONAL, -- Need OR

 measIdleDuration-r15 ENUMERATED {sec10, sec30, sec60, sec120,

 sec180, sec240, sec300, spare},

 ...,

 [[

 measIdleCarrierListNR-r16 NR-CarrierList-r16 OPTIONAL, -- Need OR

 ]]

}

EUTRA-CarrierList-r15 ::= SEQUENCE (SIZE (1..maxFreqIdle-r15)) OF MeasIdleCarrierEUTRA-r15

NR-CarrierList-r16 ::= SEQUENCE (SIZE (1..FFS)) OF MeasIdleCarrierNR-r16

MeasIdleCarrierEUTRA-r15::= SEQUENCE {

 carrierFreq-r15 ARFCN-ValueEUTRA-r9,

 allowedMeasBandwidth-r15 AllowedMeasBandwidth,

 validityArea-r15 CellList-r15 OPTIONAL, -- Need OR

 measCellList-r15 CellList-r15 OPTIONAL, -- Need OR

 reportQuantities ENUMERATED {rsrp, rsrq, both},

 qualityThreshold-r15 SEQUENCE {

 idleRSRP-Threshold-r15 RSRP-Range OPTIONAL, -- Need OR

 idleRSRQ-Threshold-r15 RSRQ-Range-r13 OPTIONAL -- Need OR

 } OPTIONAL, -- Need OP

 ...

}

MeasIdleCarrierNR-r16 ::= SEQUENCE {

 carrierFreqNR-r16 ARFCN-ValueNR-r15,

 measCellListNR-r16 CellList-NR-r16 OPTIONAL, -- Need FFS

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

 qualityThresholdNR-r16 SEQUENCE {

 idleRSRP-ThresholdNR-r16 RSRP-RangeNR-r15 OPTIONAL, -- Need FFS

 idleRSRQ-ThresholdNR-r16 RSRQ-RangeNR-r15 OPTIONAL -- Need FFS

 } OPTIONAL, -- Need FFS

 ssbMeasConfig-r16 SEQUENCE {

 frequencyBandList                   MultiFrequencyBandListNR OPTIONAL,

 maxRS-IndexCellQual-r16 MaxRS-IndexCellQualNR-r15 OPTIONAL, -- Need FFS

 threshRS-Index-r16 ThresholdListNR-r15 OPTIONAL, -- Need FFS

 measTimingConfig-r16 MTC-SSB-NR-r15 OPTIONAL, -- Need FFS

 ssbSubcarrierSpacing-r16 ENUMERATED {kHz15, kHz30, kHz120, kHz240},

 ssb-ToMeasure-r16 SSB-ToMeasure-r15 OPTIONAL, -- Need FFS

 deriveSSB-IndexFromCell-r16 BOOLEAN,

 ss-RSSI-Measurement-r16 SS-RSSI-Measurement-r15 OPTIONAL -- Need FFS

 } OPTIONAL -- Cond FFS

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

 ...

}

CellList-r15 ::= SEQUENCE (SIZE (1.. maxCellMeasIdle-r15)) OF PhysCellIdRange

CellList-NR-r16 ::= SEQUENCE (SIZE (1.. FFS)) OF PhysCellIdNR-r15

BeamMeasConfigIdle-NR-r16 ::= SEQUENCE {

 reportQuantityRS-IndexNR-r16 ENUMERATED {rsrp, rsrq, both} OPTIONAL, -- Need FFS

 maxReportRS-Index-r16 INTEGER (0..FFS) OPTIONAL, -- Need FFS

 reportRS-IndexResultsNR-r16 BOOLEAN

}

-- ASN1STOP

| *MeasIdleConfig* field descriptions |
| --- |
| ***allowedMeasBandwidth***If absent, the value corresponding to the downlink bandwidth indicated by the *dl-Bandwidt*h included in *MasterInformationBlock* of serving cell applies. |
| ***carrierFreq***Indicates the E-UTRA carrier frequency to be used for measurements during RRC\_IDLE and RRC\_INACTIVE. |
| ***measIdleCarrierListEUTRA***Indicates the E-UTRA carriers to be measured during RRC\_IDLE and RRC\_INACTIVE. |
| ***measIdleCarrierListNR***Indicates the NR carriers to be measured during RRC\_IDLE and RRC\_INACTIVE. |
| ***measIdleDuration***Indicates the duration for performing measurements during RRC\_IDLE and RRC\_INACTIVE for measurements assigned via *RRCConnectionRelease*. Value sec10 correspond to 10 seconds, value sec30 to 30 seconds and so on. |
| ***qualityThreshold***Indicates the quality thresholds for reporting the measured cells for measurements performed during RRC\_IDLE and RRC\_INACTIVE. If absent, PCell and up to *maxCellMeasIdle* strongest identified cells are considered for idle/inactive measurement reporting. |
| ***reportQuantities***Indicates which measurment quantities UE is requested to report in the idle/inactive measurement report. |
| ***measCellList***Indicates the list of cells which the UE is requested to measure and report for idle/inactive measurements. |
| ***validityArea***Indicates the list of cells within which UE is requested to do measurements during RRC\_IDLE or RRC\_INACTIVE. If the UE reselects to a cell whose physical cell identity does not match any entry in *validityArea* for the corresponding carrier frequency, the measurements are no longer required. |

[…]

#### – *MeasResults*

The IE *MeasResults* covers measured results for intra-frequency, inter-frequency and inter- RAT mobility.

*MeasResults* information element

-- ASN1START

MeasResults ::= SEQUENCE {

 measId MeasId,

 measResultPCell SEQUENCE {

 rsrpResult RSRP-Range,

 rsrqResult RSRQ-Range

 },

 measResultNeighCells CHOICE {

 measResultListEUTRA MeasResultListEUTRA,

 measResultListUTRA MeasResultListUTRA,

 measResultListGERAN MeasResultListGERAN,

 measResultsCDMA2000 MeasResultsCDMA2000,

 ...,

 measResultNeighCellListNR-r15 MeasResultCellListNR-r15

 } OPTIONAL,

 ...,

 [[ measResultForECID-r9 MeasResultForECID-r9 OPTIONAL

 ]],

 [[ locationInfo-r10 LocationInfo-r10 OPTIONAL,

 measResultServFreqList-r10 MeasResultServFreqList-r10 OPTIONAL

 ]],

 [[ measId-v1250 MeasId-v1250 OPTIONAL,

 measResultPCell-v1250 RSRQ-Range-v1250 OPTIONAL,

 measResultCSI-RS-List-r12 MeasResultCSI-RS-List-r12 OPTIONAL

 ]],

 [[ measResultForRSSI-r13 MeasResultForRSSI-r13 OPTIONAL,

 measResultServFreqListExt-r13 MeasResultServFreqListExt-r13 OPTIONAL,

 measResultSSTD-r13 MeasResultSSTD-r13 OPTIONAL,

 measResultPCell-v1310 SEQUENCE {

 rs-sinr-Result-r13 RS-SINR-Range-r13

 } OPTIONAL,

 ul-PDCP-DelayResultList-r13 UL-PDCP-DelayResultList-r13 OPTIONAL,

 measResultListWLAN-r13 MeasResultListWLAN-r13 OPTIONAL

 ]],

 [[ measResultPCell-v1360 RSRP-Range-v1360 OPTIONAL

 ]],

 [[ measResultListCBR-r14 MeasResultListCBR-r14 OPTIONAL,

 measResultListWLAN-r14 MeasResultListWLAN-r14 OPTIONAL

 ]],

 [[ measResultServFreqListNR-r15 MeasResultServFreqListNR-r15 OPTIONAL,

 measResultCellListSFTD-r15 MeasResultCellListSFTD-r15 OPTIONAL

 ]],

 [[ logMeasResultListBT-r15 LogMeasResultListBT-r15 OPTIONAL,

 logMeasResultListWLAN-r15 LogMeasResultListWLAN-r15 OPTIONAL,

 measResultSensing-r15 MeasResultSensing-r15 OPTIONAL,

 heightUE-r15 INTEGER (-400..8880) OPTIONAL

 ]]

}

MeasResultListEUTRA ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA

MeasResultEUTRA ::= SEQUENCE {

 physCellId PhysCellId,

 cgi-Info SEQUENCE {

 cellGlobalId CellGlobalIdEUTRA,

 trackingAreaCode TrackingAreaCode,

 plmn-IdentityList PLMN-IdentityList2 OPTIONAL

 } OPTIONAL,

 measResult SEQUENCE {

 rsrpResult RSRP-Range OPTIONAL,

 rsrqResult RSRQ-Range OPTIONAL,

 ...,

 [[ additionalSI-Info-r9 AdditionalSI-Info-r9 OPTIONAL

 ]],

 [[ primaryPLMN-Suitable-r12 ENUMERATED {true} OPTIONAL,

 measResult-v1250 RSRQ-Range-v1250 OPTIONAL

 ]],

 [[ rs-sinr-Result-r13 RS-SINR-Range-r13 OPTIONAL,

 cgi-Info-v1310 SEQUENCE {

 freqBandIndicator-r13 FreqBandIndicator-r11 OPTIONAL,

 multiBandInfoList-r13 MultiBandInfoList-r11 OPTIONAL,

 freqBandIndicatorPriority-r13 ENUMERATED {true} OPTIONAL

 } OPTIONAL

 ]],

 [[

 measResult-v1360 RSRP-Range-v1360 OPTIONAL

 ]],

 [[

 cgi-Info-5GC-r15 SEQUENCE (SIZE (1..maxPLMN-r11)) OF CellAccessRelatedInfo-5GC-r15 OPTIONAL

 ]]

 }

}

MeasResultListIdle-r15 ::= SEQUENCE (SIZE (1..maxIdleMeasCarriers-r15)) OF MeasResultIdle-r15

MeasResultIdle-r15 ::= SEQUENCE {

 measResultServingCell-r15 SEQUENCE {

 rsrpResult-r15 RSRP-Range,

 rsrqResult-r15 RSRQ-Range-r13

 },

 measResultNeighCells-r15 CHOICE {

 measResultIdleListEUTRA-r15 MeasResultIdleListEUTRA-r15,

 ...

 } OPTIONAL,

 ...

}

MeasResultIdleListEUTRA-r15 ::= SEQUENCE (SIZE (1..maxCellMeasIdle-r15)) OF MeasResultIdleEUTRA-r15

MeasResultIdleEUTRA-r15 ::= SEQUENCE {

 carrierFreq-r15 ARFCN-ValueEUTRA-r9,

 physCellId-r15 PhysCellId,

 measResult-r15 SEQUENCE {

 rsrpResult-r15 RSRP-Range,

 rsrqResult-r15 RSRQ-Range-r13

 },

 ...

}

MeasResultListIdle-r16 ::= SEQUENCE {

 measResultServingCell-r16 SEQUENCE {

 rsrpResult-r16 RSRP-Range,

 rsrqResult-r16 RSRQ-Range-r13

 },

 measResultsPerCarrierIdle-r16 SEQUENCE (SIZE (1..FFS)) OF MeasResultIdle-r16,

 ...

}

MeasResultIdle-r16 ::= SEQUENCE {

 measResultNeighCells-r16 CHOICE {

 measResultIdleListEUTRA-r16 MeasResultIdleListEUTRA-r16,

 measResultIdleListNR-r16 MeasResultIdleListNR-r16,

 ...

 } OPTIONAL,

 ...

}

MeasResultIdleListEUTRA-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueEUTRA-r9,

 measResultsPerEUTRACellIdle-r16 SEQUENCE (SIZE (1..FFS)) OF MeasResultIdleEUTRA-r16,

 ...

}

MeasResultIdleEUTRA-r16 ::= SEQUENCE {

 physCellId-r16 PhysCellId,

 measResult-r16 SEQUENCE {

 rsrpResult-r16 RSRP-Range,

 rsrqResult-r15 RSRQ-Range-r13

 },

 ...

}

MeasResultIdleListNR-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR-r15,

 measResultsPerNRCellIdle-r16 SEQUENCE (SIZE (1..FFS)) OF MeasResultIdleNR-r16,

 ...

}

MeasResultIdleNR-r16 ::= SEQUENCE {

 physCellId-r16 PhysCellIdNR-r15,

 measResult-r16 SEQUENCE {

 rsrpResult-r16 RSRP-RangeNR-r15 OPTIONAL,

 rsrqResult-r16 RSRQ-RangeNR-r15 OPTIONAL,

 resultRS-IndexList-r16 ResultsPerSSB-IndexList-r16 OPTIONAL

 },

 ...

}

ResultsPerSSB-IndexList-r16 ::= SEQUENCE (SIZE (1..FFS)) OF ResultsPerSSB-IndexIdle-r16

ResultsPerSSB-IndexIdle-r16 ::= SEQUENCE {

 ssb-Index-r16 RS-IndexNR-r15,

 ssb-Results-r16 SEQUENCE {

 ssbRsrpResult-r16 RSRP-RangeNR-r15 OPTIONAL,

 ssbRsrqResult-r16 RSRQ-RangeNR-r15 OPTIONAL

 } OPTIONAL

}

MeasResultServFreqListNR-r15 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServFreqNR-r15

MeasResultServFreqNR-r15 ::= SEQUENCE {

 carrierFreq-r15 ARFCN-ValueNR-r15,

 measResultSCell-r15 MeasResultCellNR-r15 OPTIONAL,

 measResultBestNeighCell-r15 MeasResultCellNR-r15 OPTIONAL,

 ...

}

MeasResultCellListNR-r15::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCellNR-r15

MeasResultCellNR-r15 ::= SEQUENCE {

 pci-r15 PhysCellIdNR-r15,

 measResultCell-r15 MeasResultNR-r15,

 measResultRS-IndexList-r15 MeasResultSSB-IndexList-r15 OPTIONAL,

 ...,

 [[ cgi-Info-r15 CGI-InfoNR-r15 OPTIONAL

 ]]

}

MeasResultNR-r15 ::= SEQUENCE {

 rsrpResult-r15 RSRP-RangeNR-r15 OPTIONAL,

 rsrqResult-r15 RSRQ-RangeNR-r15 OPTIONAL,

 rs-sinr-Result-r15 RS-SINR-RangeNR-r15 OPTIONAL,

 ...

}

MeasResultSSB-IndexList-r15::= SEQUENCE (SIZE (1..maxRS-IndexReport-r15)) OF MeasResultSSB-Index-r15

MeasResultSSB-Index-r15 ::= SEQUENCE {

 ssb-Index-r15 RS-IndexNR-r15,

 measResultSSB-Index-r15 MeasResultNR-r15 OPTIONAL,

 ...

}

MeasResultServFreqList-r10 ::= SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServFreq-r10

MeasResultServFreqListExt-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServFreq-r13

MeasResultServFreq-r10 ::= SEQUENCE {

 servFreqId-r10 ServCellIndex-r10,

 measResultSCell-r10 SEQUENCE {

 rsrpResultSCell-r10 RSRP-Range,

 rsrqResultSCell-r10 RSRQ-Range

 } OPTIONAL,

 measResultBestNeighCell-r10 SEQUENCE {

 physCellId-r10 PhysCellId,

 rsrpResultNCell-r10 RSRP-Range,

 rsrqResultNCell-r10 RSRQ-Range

 } OPTIONAL,

 ...,

 [[ measResultSCell-v1250 RSRQ-Range-v1250 OPTIONAL,

 measResultBestNeighCell-v1250 RSRQ-Range-v1250 OPTIONAL

 ]],

 [[ measResultSCell-v1310 SEQUENCE {

 rs-sinr-Result-r13 RS-SINR-Range-r13

 } OPTIONAL,

 measResultBestNeighCell-v1310 SEQUENCE {

 rs-sinr-Result-r13 RS-SINR-Range-r13

 } OPTIONAL

 ]]

}

MeasResultServFreq-r13 ::= SEQUENCE {

 servFreqId-r13 ServCellIndex-r13,

 measResultSCell-r13 SEQUENCE {

 rsrpResultSCell-r13 RSRP-Range,

 rsrqResultSCell-r13 RSRQ-Range-r13,

 rs-sinr-Result-r13 RS-SINR-Range-r13 OPTIONAL

 } OPTIONAL,

 measResultBestNeighCell-r13 SEQUENCE {

 physCellId-r13 PhysCellId,

 rsrpResultNCell-r13 RSRP-Range,

 rsrqResultNCell-r13 RSRQ-Range-r13,

 rs-sinr-Result-r13 RS-SINR-Range-r13 OPTIONAL

 } OPTIONAL,

 ...,

 [[ measResultBestNeighCell-v1360 SEQUENCE {

 rsrpResultNCell-v1360 RSRP-Range-v1360

 } OPTIONAL

 ]]

}

MeasResultCSI-RS-List-r12 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCSI-RS-r12

MeasResultCSI-RS-r12 ::= SEQUENCE {

 measCSI-RS-Id-r12 MeasCSI-RS-Id-r12,

 csi-RSRP-Result-r12 CSI-RSRP-Range-r12,

 ...

}

MeasResultListUTRA ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultUTRA

MeasResultUTRA ::= SEQUENCE {

 physCellId CHOICE {

 fdd PhysCellIdUTRA-FDD,

 tdd PhysCellIdUTRA-TDD

 },

 cgi-Info SEQUENCE {

 cellGlobalId CellGlobalIdUTRA,

 locationAreaCode BIT STRING (SIZE (16)) OPTIONAL,

 routingAreaCode BIT STRING (SIZE (8)) OPTIONAL,

 plmn-IdentityList PLMN-IdentityList2 OPTIONAL

 } OPTIONAL,

 measResult SEQUENCE {

 utra-RSCP INTEGER (-5..91) OPTIONAL,

 utra-EcN0 INTEGER (0..49) OPTIONAL,

 ...,

 [[ additionalSI-Info-r9 AdditionalSI-Info-r9 OPTIONAL

 ]],

 [[ primaryPLMN-Suitable-r12 ENUMERATED {true} OPTIONAL

 ]]

 }

}

MeasResultListGERAN ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultGERAN

MeasResultGERAN ::= SEQUENCE {

 carrierFreq CarrierFreqGERAN,

 physCellId PhysCellIdGERAN,

 cgi-Info SEQUENCE {

 cellGlobalId CellGlobalIdGERAN,

 routingAreaCode BIT STRING (SIZE (8)) OPTIONAL

 } OPTIONAL,

 measResult SEQUENCE {

 rssi INTEGER (0..63),

 ...

 }

}

MeasResultsCDMA2000 ::= SEQUENCE {

 preRegistrationStatusHRPD BOOLEAN,

 measResultListCDMA2000 MeasResultListCDMA2000

}

MeasResultListCDMA2000 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCDMA2000

MeasResultCDMA2000 ::= SEQUENCE {

 physCellId PhysCellIdCDMA2000,

 cgi-Info CellGlobalIdCDMA2000 OPTIONAL,

 measResult SEQUENCE {

 pilotPnPhase INTEGER (0..32767) OPTIONAL,

 pilotStrength INTEGER (0..63),

 ...

 }

}

MeasResultListWLAN-r13 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultWLAN-r13

MeasResultListWLAN-r14 ::= SEQUENCE (SIZE (1..maxWLAN-Id-Report-r14)) OF MeasResultWLAN-r13

MeasResultWLAN-r13 ::= SEQUENCE {

 wlan-Identifiers-r13 WLAN-Identifiers-r12,

 carrierInfoWLAN-r13 WLAN-CarrierInfo-r13 OPTIONAL,

 bandWLAN-r13 WLAN-BandIndicator-r13 OPTIONAL,

 rssiWLAN-r13 WLAN-RSSI-Range-r13,

 availableAdmissionCapacityWLAN-r13 INTEGER (0..31250) OPTIONAL,

 backhaulDL-BandwidthWLAN-r13 WLAN-backhaulRate-r12 OPTIONAL,

 backhaulUL-BandwidthWLAN-r13 WLAN-backhaulRate-r12 OPTIONAL,

 channelUtilizationWLAN-r13 INTEGER (0..255) OPTIONAL,

 stationCountWLAN-r13 INTEGER (0..65535) OPTIONAL,

 connectedWLAN-r13 ENUMERATED {true} OPTIONAL,

 ...

}

MeasResultListCBR-r14 ::= SEQUENCE (SIZE (1..maxCBR-Report-r14)) OF MeasResultCBR-r14

MeasResultCBR-r14 ::= SEQUENCE {

 poolIdentity-r14 SL-V2X-TxPoolReportIdentity-r14,

 cbr-PSSCH-r14 SL-CBR-r14,

 cbr-PSCCH-r14 SL-CBR-r14 OPTIONAL

}

MeasResultSensing-r15 ::= SEQUENCE {

 sl-SubframeRef-r15 INTEGER (0..10239),

 sensingResult-r15 SEQUENCE (SIZE (0..400)) OF SensingResult-r15

}

SensingResult-r15 ::= SEQUENCE {

 resourceIndex-r15 INTEGER (1..2000)

}

MeasResultForECID-r9 ::= SEQUENCE {

 ue-RxTxTimeDiffResult-r9 INTEGER (0..4095),

 currentSFN-r9 BIT STRING (SIZE (10))

}

PLMN-IdentityList2 ::= SEQUENCE (SIZE (1..5)) OF PLMN-Identity

AdditionalSI-Info-r9 ::= SEQUENCE {

 csg-MemberStatus-r9 ENUMERATED {member} OPTIONAL,

 csg-Identity-r9 CSG-Identity OPTIONAL

}

MeasResultForRSSI-r13 ::= SEQUENCE {

 rssi-Result-r13 RSSI-Range-r13,

 channelOccupancy-r13 INTEGER (0..100),

 ...

}

UL-PDCP-DelayResultList-r13 ::= SEQUENCE (SIZE (1..maxQCI-r13)) OF UL-PDCP-DelayResult-r13

UL-PDCP-DelayResult-r13 ::= SEQUENCE {

 qci-Id-r13 ENUMERATED {qci1, qci2, qci3, qci4, spare4, spare3, spare2, spare1},

 excessDelay-r13 INTEGER (0..31),

 ...

}

CGI-InfoNR-r15 ::= SEQUENCE {

 plmn-IdentityInfoList-r15 PLMN-IdentityInfoListNR-r15 OPTIONAL,

 frequencyBandList-15 MultiFrequencyBandListNR-r15 OPTIONAL,

 noSIB1-r15 SEQUENCE {

 ssb-SubcarrierOffset-r15 INTEGER (0..15),

 pdcch-ConfigSIB1-r15 INTEGER (0..255)

 } OPTIONAL,

 ...

}

CellIdentityNR-r15 ::= BIT STRING (SIZE (36))

PLMN-IdentityListNR-r15 ::= SEQUENCE (SIZE (1.. maxPLMN-NR-r15)) OF PLMN-Identity

PLMN-IdentityInfoListNR-r15 ::= SEQUENCE (SIZE (1..maxPLMN-NR-r15)) OF PLMN-IdentityInfoNR-r15

PLMN-IdentityInfoNR-r15 ::= SEQUENCE {

 plmn-IdentityList-r15 PLMN-IdentityListNR-r15,

 trackingAreaCode-r15 TrackingAreaCodeNR-r15 OPTIONAL,

 ran-AreaCode-r15 RAN-AreaCode-r15 OPTIONAL,

 cellIdentity-r15 CellIdentityNR-r15

}

TrackingAreaCodeNR-r15 ::= BIT STRING (SIZE (24))

-- ASN1STOP

| *MeasResults* field descriptions |
| --- |
| ***availableAdmissionCapacityWLAN***Indicates the available admission capacity of WLAN as defined in IEEE 802.11-2012 [67]. |
| ***backhaulDL-BandwidthWLAN***Indicates the backhaul available downlink bandwidth of WLAN, equal to Downlink Speed times Downlink Load defined in Wi-Fi Alliance Hotspot 2.0 [76]. |
| ***backhaulUL-BandwidthWLAN***Indicates the backhaul available uplink bandwidth of WLAN, equal to Uplink Speed times Uplink Load defined in Wi-Fi Alliance Hotspot 2.0 [76]. |
| ***bandWLAN***Indicates the WLAN band. |
| ***carrierFreq***Indicates the carrier frequency. Within *MeasResultIdleListEUTRA-r15*, UE only includes measurements with the same carrier frequency. |
| ***carrierInfoWLAN***Indicates the WLAN channel information. |
| ***cbr-PSSCH***Indicates the CBR measurement results on the PSSCH of the pool indicated by *poolIdentity*. If *adjacencyPSCCH-PSSCH* is set to *TRUE* for the pool indicated by *pooIIdentit*y, this field indicates the CBR measurement of both the PSSCH and PSCCH resources which are measured together. |
| ***cbr-PSCCH***Indicates the CBR measurement results on the PSCCH of the pool indicated by *poolIdentity.* This field is only included if *adjacencyPSCCH-PSSCH* is set to *FALSE* for the pool indicated by *pooIIdentity*. |
| ***channelOccupancy***Indicates the percentage of samples when the RSSI was above the configured *channelOccupancyThreshold* for the associated *reportConfig*. |
| ***channelUtilizationWLAN***Indicates WLAN channel utilization as defined in IEEE 802.11-2012 [67]. |
| ***connectedWLAN***Indicates whether the UE is connected to the WLAN for which the measurement results are applicable. |
| ***csg-MemberStatus***Indicates whether or not the UE is a member of the CSG of the neighbour cell. |
| ***currentSFN***Indicates the current system frame number when receiving the UE Rx-Tx time difference measurement results from lower layer. |
| ***excessDelay***Indicates excess queueing delay ratio in UL, according to excess delay ratio measurement report mapping table, as defined in TS 36.314 [71], Table 4.2.1.1.1-1. |
| ***heightUE***Indicates height of the UE in meters relative to the sea level. Value 0 corresponds to sea level (i.e., negative value indicates depth of the UE below sea level). Value -400 corresponds to -400 m, value -399 corresponds to -399 m and so on. |
| ***locationAreaCode***A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27]. |
| ***measId***Identifies the measurement identity for which the reporting is being performed. If the *measId-v1250* is included, the *measId* (i.e. without a suffix) is ignored by eNB. |
| ***measResult***Measured result of an E‑UTRA cell;Measured result of a UTRA cell;Measured result of a GERAN cell or frequency;Measured result of a CDMA2000 cell;Measured result of a WLAN;Measured result of UE Rx–Tx time difference;Measured result of UE SFN, radio frame and subframe timing difference; orMeasured result of RSSI and channel occupancy. |
| ***measResultCSI-RS-List***Measured results of the CSI-RS resources in discovery signals measurement.  |
| ***measResultListCDMA2000***List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity. |
| ***measResultListEUTRA***List of measured results for the maximum number of reported best cells for an E‑UTRA measurement identity. For UE supporting CE Mode B, when CE mode B is not restricted by upper layers, *measResult-v1360* is reported if the measured RSRP is less than -140 dBm. |
| ***measResultListGERAN***List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity. |
| ***measResultListSFTD***List of measured SFTD results for the reported cells for a NR measurement identity. |
| ***measResultListUTRA***List of measured results for the maximum number of reported best cells for a UTRA measurement identity. |
| ***measResultListWLAN***List of measured results for the maximum number of reported best WLAN outside the WLAN mobility set and connected WLAN, if any, for a WLAN measurement identity. |
| ***measResultPCell***Measured result of the PCell. For BL UEs or UEs in CE, when operating in CE Mode B, *measResultPCell-v1360* is reported if the measured RSRP is less than -140 dBm. |
| **measResultsCDMA2000**Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements. |
| ***MeasResultServFreqList***Measured results of the serving frequencies: the measurement result of each SCell, if any, and of the best neighbouring cell on each serving frequency. For UE supporting CE Mode B, when CE mode B is not restricted by upper layers, *measResultBestNeighCell-v1360* is reported if the measured RSRP is less than -140 dBm. |
| ***measResultServingCell***Measured results of the serving cell (i.e., PCell) from idle/inactive measurements. |
| ***noSIB1***Contains *ssb-SubcarrierOffset* and *pdcch-ConfigSIB1* fields acquired by the UE from MIB of the cell for which report CGI procedure was requested by the network in case SIB1 was not broadcast by the cell. |
| ***pilotPnPhase***Indicates the arrival time of a CDMA2000 pilot, measured relative to the UE's time reference in units of PN chips, see C.S0005 [25]. This information is used in either SRVCC handover or enhanced 1xRTT CS fallback procedure to CDMA2000 1xRTT. |
| ***pilotStrength***CDMA2000 Pilot Strength, the ratio of pilot power to total power in the signal bandwidth of a CDMA2000 Forward Channel. See C.S0005 [25] for CDMA2000 1xRTT and C.S0024 [26] for CDMA2000 HRPD. |
| ***poolIdentity***The identity of the transmission resource pool which is corresponding to the *poolReportId* configured ina resource pool for V2X sidelink communication. |
| ***plmn-IdentityList***The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast. |
| ***preRegistrationStatusHRPD***Set to TRUE if the UE is currently pre-registered with CDMA2000 HRPD. Otherwise set to FALSE. This can be ignored by the eNB for CDMA2000 1xRTT. |
| ***qci-Id***Indicates QCI value for which *excessDelay* is provided, according to TS 36.314 [71]. |
| **resourceIndex**Indicates the available resource candidates within the [T1, T2] window as specified in TS 36.213 [23]. clause 14.1.1.6. Value 1 indicates the resource candidate on the subframe indicated by *sl-SubframeRe*f, from subchannel 0 to *sensingSubchannelNumber*-1. Value 2 indicates the resource candidate on the first subframe following the subframe indicated by *sl-SubframeRef*, from subchannel 0 to *sensingSubchannelNumber*-1 (Value 101 indicates the resource candidate on the subframe indicated by *sl-SubframeRef*, from subchannel 1 to *sensingSubchannelNumber*, if the *numSubchannel* of the resource pool is larger than *sensingSubchannelNumber*) and so on. |
| ***routingAreaCode***The RAC identity read from broadcast information, as defined in TS 23.003 [27]. |
| ***rsrpResult***Measured RSRP result of an E‑UTRA cell.The rsrpResult is only reported if configured by the eNB. |
| ***rsrqResult***Measured RSRQ result of an E‑UTRA cell.The rsrqResult is only reported if configured by the eNB. |
| ***rssi***GERAN Carrier RSSI. RXLEV is mapped to a value between 0 and 63, TS 45.008 [28]. When mapping the RXLEV value to the RSSI bit string, the first/leftmost bit of the bit string contains the most significant bit. |
| ***rssi-Result***Measured RSSI result in dBm. |
| ***rs-sinr-Result***Measured RS-SINR result of an E‑UTRA or NR cell. The *rs-sinr-Result* is only reported if configured by the eNB. |
| ***rssiWLAN***Measured WLAN RSSI result in dBm. |
| ***sl-SubframeRef***Indicates the subframe corresponding to n+T1 used to obtain the sensing measurement results (see TS 36.213 [23]). Specifically, the value indicates the timing offset with respect to subframe#0 of DFN#0 in milliseconds. |
| ***stationCountWLAN***Indicates the total number stations currently associated with this WLAN as defined in IEEE 802.11-2012 [67]. |
| ***ue-RxTxTimeDiffResult***UE Rx-Tx time difference measurement result of the PCell, provided by lower layers. If *ue-RxTxTimeDiffPeriodicalTDD-r13* is set to *TRUE*, the measurement mapping is according to EUTRAN TDD UE Rx-Tx time difference report mapping in TS 36.133 [16] and measurement result includes *NTAoffset*, else the measurement mapping is according to EUTRAN FDD UE Rx-Tx time difference report mapping in TS 36.133 [16]. |
| ***utra-EcN0***According to CPICH\_Ec/No in TS 25.133 [29] for FDD. Fourteen spare values. The field is not present for TDD. |
| ***utra-RSCP***According to CPICH\_RSCP in TS 25.133 [29] for FDD and P-CCPCH\_RSCP in TS 25.123 [30] for TDD. Thirty-one spare values. |
| ***wlan-Identifiers***Indicates the WLAN parameters used for identification of the WLAN for which the measurement results are applicable. |

END OF CHANGES

START OF CHANGES

### 6.3.6 Other information elements

#### – *UE-EUTRA-Capability*

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

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

*UE-EUTRA-Capability* information element

-- ASN1START

<<skipped parts>>

UE-EUTRA-Capability-v1560-IEs ::= SEQUENCE {

 pdcp-ParametersNR-v1560 PDCP-ParametersNR-v1560,

 irat-ParametersNR-v1560 IRAT-ParametersNR-v1560,

 appliedCapabilityFilterCommon-r15 OCTET STRING OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1560 UE-EUTRA-CapabilityAddXDD-Mode-v1560,

 tdd-Add-UE-EUTRA-Capabilities-v1560 UE-EUTRA-CapabilityAddXDD-Mode-v1560,

 nonCriticalExtension UE-EUTRA-Capability-v16xx-IEs OPTIONAL

}

Editor’s note: The need for capability indicating support for maintaining MCG SCells on resume is FFS.

<<skipped parts>>

IRAT-ParametersNR-r15 ::= SEQUENCE {

 en-DC-r15 ENUMERATED {supported} OPTIONAL,

 eventB2-r15 ENUMERATED {supported} OPTIONAL,

 supportedBandListEN-DC-r15 SupportedBandListNR-r15 OPTIONAL

}

IRAT-ParametersNR-v1540 ::= SEQUENCE {

 eutra-5GC-HO-ToNR-FDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-5GC-HO-ToNR-TDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-5GC-HO-ToNR-FDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 eutra-5GC-HO-ToNR-TDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-FDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-TDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-FDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-TDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 ims-VoiceOverNR-FR1-r15 ENUMERATED {supported} OPTIONAL,

 ims-VoiceOverNR-FR2-r15 ENUMERATED {supported} OPTIONAL,

 sa-NR-r15 ENUMERATED {supported} OPTIONAL,

 supportedBandListNR-SA-r15 SupportedBandListNR-r15 OPTIONAL

}

IRAT-ParametersNR-v15x0 ::= SEQUENCE {

 ng-en-DC-r15 ENUMERATED {supported} OPTIONAL

}

Editor’s note: The need for capability indicating support for maintaining SCG on resume is FFS.

<<skipped parts>>

-- ASN1STOP

|  |  |
| --- | --- |
|  |  |

END OF CHANGES

START OF CHANGES

## 7.1 UE variables

#### – *VarMeasIdleConfig*

The UE variable *VarMeasIdleConfig* includes the configuration of the measurements to be performed by the UE while in RRC\_IDLE for E-UTRA and NR inter-frequency measurements. The UE performs logging of these measurements only while in RRC\_IDLE or RRC\_INACTIVE.

*VarMeasIdleConfig* UE variable

-- ASN1START

VarMeasIdleConfig-r15 ::= SEQUENCE {

 measIdleCarrierListEUTRA-r15 EUTRA-CarrierList-r15 OPTIONAL,

 measIdleDuration-r15 ENUMERATED {sec10, sec30, sec60, sec120,

 sec180, sec240, sec300}

}

VarMeasIdleConfig-r16 ::= SEQUENCE {

 measIdleCarrierListEUTRA-r15 EUTRA-CarrierList-r15 OPTIONAL,

 measIdleCarrierListNR-r16 NR-CarrierList-r16

 measIdleDuration-r15 ENUMERATED {sec10, sec30, sec60, sec120,

 sec180, sec240, sec300}

}

-- ASN1STOP

#### – *VarMeasIdleReport*

The UE variable *VarMeasIdleReport* includes the logged measurements information.

*VarMeasIdleReport* UE variable

-- ASN1START

VarMeasIdleReport-r15 ::= SEQUENCE {

 measReportIdle-r15 MeasResultListIdle-r15

}

VarMeasIdleReport-r16 ::= SEQUENCE {

 measReportIdle-r16 MeasResultListIdle-r16

}

-- ASN1STOP

END OF CHANGES

START OF CHANGES

## 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 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 | 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* | 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. |
| 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 | 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 | 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 | Inform upper layers about barring alleviation for ACDC as specified in 5.3.3.7 |
| T309 | 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 and upon initiating the connection re-establishment 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 optimisation: go to RRC\_IDLE else: initiate the MCG failure information procedure as specified in 5.6.x 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. | Enter RRC\_IDLE |
| T312NOTE2 | Upon triggering a measurement report for a measurement identity for which T312 has been configured, 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, and upon the expiry of T310 | If security is not activated: go to RRC\_IDLE else: initiate the MCG failure information procedure as specified in 5.6.x 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. |
| 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 | 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 RAT, or upon reception of *RRCEarlyDataComplete* or *RRCConnectionRelease* for UP-EDT | Release *redirectedCarrierOffsetDedicated*. |
| 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* or, if *validityArea* is configured, upon reselecting to cell that does not belong to *validityArea*. | Release the stored *VarMeasIdleConfig.*  |
| T340NOTE2 | Upon transmitting *UEAssistanceInformation* message with *powerPrefIndication* set to *normal* | Upon initiating the connection re-establishment procedure | No action. |
| T341NOTE2 | Upon transmitting *UEAssistanceInformation* message with *bw-Preference.* | Upon resuming an RRC connection or upon initiating the connection re-establishment procedure | No action. |
| T342NOTE2 | Upon transmitting *DelayBudgetReport* message. | Upon initiating the connection re-establishment and connection resume procedures | 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*. |
| 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. |
| 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 initiating the connection re-establishment procedure | No action. |
| T380 | Upon reception of *periodic-RNAU-timer* in RRCConnectionRelease. | Upon reception of *RRCConnectionResume*, *RRCConnectionRelease* or *RRCConnectionSetup*. | Initiate the RAN notification area update procedure |
| T316 | Upon transmission of the *MCGFailureInformation* message | Upon resumption of MCG transmission, upon reception of *RRCConnectionRelease*, or upon initiaitng the re-establishment procedure, | Perform the actions as specified in 5.6.x.5 |
| NOTE1: Only the timers marked with "NOTE1" are applicable to NB-IoT.NOTE2: The behaviour as specified in 7.3.2 applies. |

END OF CHANGES

# Annex A (informative): Guidelines, mainly on use of ASN.1

## A.6 Protection of RRC messages (informative)

The following list provides information which messages can be sent (unprotected) prior to security activation and which messages can be sent unprotected after security activation. Those messages indicated "-" in "P" column should never be sent unprotected by eNB or UE. Further requirements are defined in the procedural text.

P…Messages that can be sent (unprotected) prior to security activation

A - I…Messages that can be sent without integrity protection after security activation

A - C…Messages that can be sent unciphered after security activation

NA… Message can never be sent after security activation

| Message | P | A-I | A-C | Comment |
| --- | --- | --- | --- | --- |
| CSFBParametersRequestCDMA2000 | **+** | **-** | **-** |  |
| CSFBParametersResponseCDMA2000 | + | - | - |  |
| CounterCheck | - | -  | -  |  |
| CounterCheckResponse | - | -  | -  |  |
| DelayBudgetReport | - | - | - |  |
| DLInformationTransfer | + | - | - |  |
| FailureInformation | - | - | - |  |
| HandoverFromEUTRAPreparationRequest (CDMA2000) | - | -  | -  |  |
| InDeviceCoexIndication | - | -  | -  |  |
| InterFreqRSTDMeasurementIndication | - | - | - |  |
| LoggedMeasurementsConfiguration | - | - | - |  |
| MasterInformationBlock | + | + | + |  |
| MasterInformationBlock-MBMS | + | + | + |  |
| MBMSCountingRequest | + | + | + |  |
| MBMSCountingResponse | - | - | - |  |
| MBMSInterestIndication | + | - | - |  |
| MBSFNAreaConfiguration | + | + | + |  |
| MeasReportAppLayer | - | - | - |  |
| MCGFailureInformation | - | - | - |  |
| MeasurementReport | - | - | - | Measurement configuration may be sent prior to security activation. But: In order to protect privacy of UEs, MEASUREMENT REPORT is only sent from the UE after successful security activation. |
| MobilityFromEUTRACommand | - | -  | - |  |
| Paging | + | + | + |  |
| ProximityIndication | - | - | - |  |
| RNReconfiguration | - | - | - |  |
| RNReconfigurationComplete | - | - | - |  |
| RRCConnectionReconfiguration | + | - | - | The message shall not be sent unprotected before security activation if it is used to perform handover or to establish SRB2, SRB4 and DRBs |
| RRCConnectionReconfigurationComplete | + | - | - | Unprotected, if sent as response to RRCConnectionReconfiguration which was sent before security activation |
| RRCConnectionReestablishment | - | + | + | This message is not protected by PDCP operation. |
| RRCConnectionReestablishmentComplete | - | - | - |  |
| RRCConnectionReestablishmentReject | - | + | + | One reason to send this may be that the security context has been lost, therefore sent as unprotected.  |
| RRCConnectionReestablishmentRequest | - | - | + | This message is not protected by PDCP operation. However, a short MAC-I is included. |
| RRCConnectionReject | + | + | + | Except for UP-EDT, A-I and A-C are NA. |
| RRCConnectionRelease | + | - | - | Justification for P: If the RRC connection only for signalling not requiring DRBs or ciphered messages, or the signalling connection has to be released prematurely, this message is sent as unprotected.For UP-EDT, the message is only sent after successful security activation.*RRCConnectionRelease* message sent before security activation cannot include *rrc-InactiveConfig, redirectedCarrierInfo, idleModeMobilityControlInfo* information fields when UE is connected to 5GC. |
| RRCConnectionRequest | + | NA | NA |  |
| RRCConnectionResume | - | - | + | When this message is transmitted, security is activated but suspended. Integrity verification is done after the message received by RRC.For UP-EDT, the message is only sent after successful security activation.For RRC\_INACTIVE state, the message is protected with both integrity and ciphering. |
| RRCConnectionResumeRequest | - | - | + | This message is not protected by PDCP operation. However, a short MAC-I is included. |
| RRCConnectionResumeComplete | - | - | - |  |
| RRCConnectionSetup | + | NA | NA |  |
| RRCConnectionSetupComplete | + | NA | NA |  |
| RRCEarlyDataRequest | + | NA | NA |  |
| RRCEarlyDataComplete | + | NA | NA |  |
| SCGFailureInformation | - | - | - |  |
| SCGFailureInformationNR | - | - | - |  |
| SCPTMConfiguration | + | + | + |  |
| SecurityModeCommand | + | NA | NA | Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC) |
| SecurityModeComplete | - | NA | NA | Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure. |
| SecurityModeFailure | + | NA | NA | Neither integrity protection nor ciphering applied. |
| SidelinkUEInformation | + | - | - |  |
| SystemInformation | + | + | + |  |
| SystemInformationBlockType1 | + | + | + |  |
| SystemInformationBlockType1-MBMS | + | + | + |  |
| UEAssistanceInformation | - | - | - |  |
| UECapabilityEnquiry | + | - | - |  |
| UECapabilityInformation | + | - | - |  |
| UEInformationRequest | - | - | - |  |
| UEInformationResponse | - | - | - | In order to protect privacy of UEs, UEInformationResponse is only sent from the UE after successful security activation |
| ULHandoverPreparationTransfer (CDMA2000) | - | - | - | This message should follow HandoverFromEUTRAPreparationRequest |
| ULInformationTransfer | + | - | - |  |
| ULInformationTransferMRDC | - | - | - |  |
| WLANConnectionStatusReport | - | - | - |  |

# Annex (not part of the specification): RAN2 Agreements

This Annex contains the RAN2 agreements on Rel-16 WI for “DC and CA enhancements”. The agreements are provided verbatim for reference.This annex shall be removed once the WI is completed.

## RAN2#105

**Agreements:**

For IDLE/INACTIVE

1. Rel-16 early measurement configuration may contain both NR and LTE configuration, only NR configuration or only LTE configuration, to support various MR-DC and CA scenario. FFS on details. IDLE mode and INACTIVE mode details will be discussed separately
2. NR early measurement configuration should include NR specific measurement parameters configurations.
3. Available beam and cell level measurement results can be included in early measurement reporting if configured.

**Agreements:**

1. The configured SCells (MCG and SCG) can be configured in deactivated or activated state by RRC upon addition or after a handover. Timing requirements are up to RAN4. FFS if this applies to resume.

**Agreements**

1. MCG failure can be indicated to the network via the SCG. FFS ifvia SCells.
2. FFS how the failure is indicated, which SRBs, and which failure case the fast MCG failure recovery.
3. We will aim to have a unified solution for the failure cases that we want to address.

## RAN2#105bis

Agreement

1 For NR IDLE mode, the LTE rel-15 euCA early measurement reporting solution (i.e. via UEInformationRequest and UEInformationResponse like messages) after connection is setup will be supported.

2 For both LTE and NR, sending full idle mode measurements before security activation shall not be allowed.

FFS if some measurement information (detail TBD) related to idle mode measurements can be sent before security activation.

3 SMC and SMC complete messages will not be modified to enable the signalling of early measurements.

4 For both LTE and NR, RAN2 confirm that current specification allow that UEInformationRequest (or equivalent message to be specified in NR) can be sent by the network immediate after Security Mode Command without network having to wait for Security Mode Complete (i.e. similar to sending of Reconfiguration after SMC)

5 For NR INACTIVE mode, the LTE rel-15 euCA early measurement reporting solution (i.e. via UEInformationRequest and UEInformationResponse like messages) after connection is resumed will be supported.

6 Sending early measurement report is network controlled

7 For NR INACTIVE, the network can request early measurement report in RRCResume

8 For NR INACTIVE, early measurement reporting can be sent in RRCResumeComplete

FFS Whether agreements 7 and 8 should be applied to LTE RRCConnectionResume and RRCConnectionResumeComplete message.

Agreements

1: NR early measurements can be configured in both NR RRCRelease message and NR system information.

FFS: Whether there are differences in the configuration that can be provided by RRCRelease and SI.

2: Introduce some indication about the cell's early measurement support in NR system information.

3: To control the duration of UE performing both IDLE and INACTIVE measurements, a single validity timer (similar to measIdleDuration in LTE euCA) is mandatory indicated only in NR RRCRelease message, i.e. not included in NR SIB.

4: For both IDLE and INACTIVE early measurements, the following IEs can be optionally configured per NR frequency in both NR RRCRelease message and NR SIB:

- A list of frequencies and optionally cells (similar to measCellList in LTE euCA) the UE is required to perform early measurements.

- A cell quality threshold (similar to qualityThreshold in LTE euCA) the UE is required to report the measurement results only for the cells which met the configured thresholds.

FFS: A validity Area (similar to validityArea in LTE euCA) to indicate the list of cells within which UE is required to perform early measurements. If the UE reselects to a cell outside this list, the early measurements are no longer required (same as timer expiry).

 o If it is absent, the UE will not have area limitation of early measurements.

For SSB based measurements:

5: For both IDLE and INACTIVE early measurements, SSB frequencies to be measured can be located out of sync raster

6: For both IDLE and INACTIVE early measurements, RSRP and RSRQ can be configured as cell and beam measurement quantity.

7: For both IDLE and INACTIVE early measurements, the configuration parameters provided per SSB frequency follow the same principles as those provided in SIB2/4 for the purposes of Idle/Inactive mobility. (Details differences can be discussed at stage 3 level)

8: As LTE euCA, cell / beam SINR is not introduced as measurement quantity in NR early measurement configuration in Rel-16.

For SSB based beam level measurement configurations:

9 The UE is required to report the beam with the highest measurement quantity

FFS: Whether additional beams can be reported.

10: For both IDLE and INACTIVE early measurements, the UE can be configured with one of the 3 beam reporting types

1) No beam reporting;

2) Only beam identifier

3) Both beam identifier and quantity

FFS: Whether to support CSI-RS based NR early measurements

11: LTE UE in IDLE mode, IDLE with suspended, and INACTIVE can be configured with NR early measurements to support fast setup of (NG)EN-DC (i.e. euCA is extended to support NR measurements). Details are FFS

Agreements for MCG fast recovery:

0 MCG fast recovery targets all MRDC architecture options

1: When MCG failure occurs, UE follows SCG failure-like procedure:

i. UE does not trigger RRC connection re-establishment.

ii. UE triggers an MCG failure procedure in which a failure information message is transmitted to the network via SCG.

2: MCG fast recovery targets the following use cases MCG leg RLF

FFS: Other uses cases. Can consider in future whether the mechanism can be also be applied in the case of other MCG failures.

3 MCG fast recovery can only be triggered after AS security has been activated and the SRB2 and at least one DRB have been setup

4 MCG failure indication should include:

i. Available measurement results of MCG

ii. MCG link failure cause

iii. Available measurement results of SCG

iv. Available measurement results of non-serving cells

5: For MCG failure indication, new RRC message in introduced, e.g. MCGFailureInformation.

6: SCG leg of the split SRB1 can be used for MCG fast recovery.

FFS: If configured, SRB3 can be used for MCG fast recovery. Priority is to complete the solution based on split SRB1

7: New SRB is not introduced for MCG fast recovery.

## RAN2#106

Agreements

1: RAN2 confirms that for both LTE and NR, sending cell RSRP/RSRQ of idle mode measurements before security activation shall not be allowed.

2: RAN2 confirms that for both LTE and NR, sending cell PCI(s) with good quality and associated frequency of idle mode measurements before security activation shall not be allowed.

Agreement

1 How the UE applies filtering of beam measurements as part of early measurement reporting is left to UE implementation (Up to RAN4 to specify performance requirements for early measurement reporting)

2 The UE can report more than one beam measurement. Network can configure whether it wants to receive more than just the best beam

FFS whether the network can configure max number of beams and a threshold above which beams are reported

Agreements

1 The early measurement configuration can be different between that in RRCRelease and in SIB. If the UE receives the early measurement configuration from RRCRelease, this overrides the early measurement configuration provided in SIB (if any).

FFS: Whether some other measurement related configuration in SI (e.g. smtc) outside of the early measurement configuration can still be used.

2 A single early measurement configuration is provided in SI for idle and inactive

FFS: Whether the early measurement configuration can be kept when the UE receives the Release (to Inactive to Idle) in response to Resume Request.

3 L3 filtering is not applied to early measurement reporting

4 The UE performs the idle measurement for the frequencies in configured frequency list only when the UE support CA or MR-DC between the frequency and the serving frequency.

FFS Whether the network can provide information on support of CA/DC between frequencies to assist the UE to determine which frequencies to provide measurement for.

6 If UE reselects to a cell that does not support early measurements (as indicated by absence of an indicator in SI), the validity timer keeps running, but the UE is not required to performs measurements while camped on that cell (same as LTE euCA)

Agreement

1 SCell dormant state like LTE euCA will not be introduced in NR.

2 ‘dormancy’ behaviour will be studied as a solution for fast return to SCell utilisation for data transfer. The 'dormancy' behaviour implies that the UE stops monitoring PDCCH but continues other activities such as CSI measurements, AGC and beam management. RAN1/4 input required on feasibility and benefit.

1 Temporary RS resources at SCell activation will be studied as a solution for fast SCell activation. RAN1/4 input required on feasibility and benefit.

Agreements

1: Fast MCG recovery is not supported in case (intra and inter-RAT) handover failure

2: Fast MCG recovery is not supported in case of integrity check failure

3: Fast MCG recovery is not supported in case of RRC connection reconfiguration failure

Agreements

FFS Whether a guard timer is needed for the MCG failure indication message

1 Once the MCG failure indication is triggered, the UE shall:

- transmit the MCG failure indication;

− suspend MCG transmission for all SRBs and DRBs;

− reset MCG-MAC;

− maintain the current measurement configurations from both the MN and the SN, and continue measurements based on configuration from the MN and the SN if possible.

FFS whether switch the primaryPath to SCG is needed

2 If SCG failure is detected while MCG is suspended then initiate RRC re-establishment procedure

3 Upon receiving the MCG failure indication, the MN sends reconfiguration with sync or RRC Release to the UE via SRB1.

4 Upon reception of reconfig with sync the UE resumes MCG transmission if suspended

## RAN2#107

Agreements

1: For per-frequency SSB measurement configuration reuse the IE structure that is currently used in SIBs for cell reselection purposes.

2: The legacy SSB measurement configurations in NR SIB2/4 and LTE SIB24 are reused for NR early measurements performed in frequencies which are candidates of cell selection/reselection, i.e. not introduce new measurement configurations in NR/LTE SIB for these SSBs.

3: Same as LTE euCA, NR frequency list (not the SSB measurement configuration) can be different between RRC release and SIB. The frequency list, if provided, in RRC release message overrides the one provided in SIB.

4 For per frequency SSB measurement configuration for purpose of only early measurements, it can be included in both RRC release message and SIB. If provided in RRC release message, it overrides the one provided in SIB in the cell where the RRC Release message is received. (

FFS How UE manages the situation when an SSB measurement configuration for a given frequency is provided in SIB of the current cell and was also provided RRC Release (in an earlier cell).

Agreements

7: As in LTE euCA, the indication whether to report RSRP, RSRQ or both can be indicated in both RRC release message and SIB. If provided in RRC release, it overrides the one in SIB.

8: Similar to LTE euCA, the indication of beam reporting type (i.e. whether to, not report beam results, report only the beam index, or report both beam index and results) can be indicated in both RRC release message and SIB. If provided in RRC release, it overrides the one in SIB.

9: NR early measurement configuration is included in a new NR SIB.

10: NR early measurement configuration is included in LTE SIB5 (i.e. the SIB including LTE early measurement configurations)

11: It is not necessary to specify CSI-RS based early measurements for the case of SCell with SSB in Rel-16.

12: It is not necessary to specify CSI-RS based early measurements for the case of SCell without SSB in Rel-16.

13: In NR early measurement configuration, the UE can be configured with maximum number for beam reporting and only beams above configured threshold for cell quality derivation are required to be reported (as NR CONNECTED measurements).

14 Do not support the network provide information on network’s support of CA/DC between frequencies to assist the UE to determine which frequencies to provide NR early measurement in Rel-16.

15 Do not support a mechanism to prevent outdated early measurement reporting in Rel-16

Agreements:

1 Upon the reception of the RRCSetup message in response to RRCSetupRequest or RRCResumeRequest (while T331 is running), the UE stops T331, and deletes the dedicated idle mode measurement configuration, if any.

2: Upon the reception of the RRCReject message in response to RRCSetupRequest or RRCResumeRequest (while T331 is running), the UE keeps performing the idle mode measurements.

3: During a 2-step resume (i.e. RRCRelease in response to RRCResumeRequest), the network can release or reconfigure the idle mode measurements.

FFS whether this is delta or complete replace

4: Upon the expiry of T331 while in IDLE or INACTIVE mode, the UE deletes the dedicated idle mode measurement configuration, if any.

5: The UE deletes the early measurement results after it has successfully reported them to the network (i.e. in UEInformationResponse or RRCResumeComplete).

Agreements (Activation of SCells is not addressed by these agreements - to be discussed separately)

1 The LTE RRCConnectionResume message (Inactive to Connected) can contain the MCG SCell configuration and the associated UE behaviour in handling the SCell configuration is the same as in the Rel-15 RRC connection reconfiguration procedure.

2 In NR and LTE Rel-16, the UE maintains the MCG SCell configuration upon the initiation of the resume procedure.

3 The RRC(Connection)Resume message contains an indication to restore/resume the MCG SCells (noting that behaviour in legacy eNBs that don't support this feature needs to be considered).

4 The (LTE and NR) RRC(Connection)Resume (Inactive to Connected))message can contain the SCG configuration and the associated UE behaviour in handling the SCG configuration is the same as in the Rel-15 RRC (connection) reconfiguration procedure.

5 In NR and LTE Rel-16, the UE maintains the SCG configuration upon the initiation of the resume procedure.

6 The RRC(Connection)Resume message contains an indication to restore/resume the SCG (noting that behaviour in legacy e/gNBs that don't support this feature needs to be considered).

Agreements

1: Upon sending a MCG failure indication, UE starts a timer.

2: Upon resumption of MCG, UE stops the timer.

3: Upon expiry of the timer, UE initiates RRC connection re-establishment procedure.

4: Network can configure the timer value (no infinite value)

Agreements

1 If a UE is configured with split SRB1 with PDCP duplication, there is no need to switch the primaryPath upon detection of MCG failure since MCG failure indication will be transmitted via SCG RLC bearer of split SRB1.

2 If PDCP duplication is not activated, upon detection of MCG failure the primaryPath for split SRB1 is implicitly reconfigured to the SCG. The UE expects the network to explicitly reconfigure the primaryPath back to MCG in the MCG recovery or in a Re-establishment

Agreements

1: SRB3, if configured, can be used for MCG fast recovery.

2: For MCG fast recovery via SRB3, MCG Failure Information message in UL (same message as for SRB1 case) is encapsulated by the UE into an SN RRC message.

3: For MCG fast recovery via SRB3, the MN response message in DL (either a reconfiguration with sync or release message) is encapsulated by the SN in an SN RRC message.

FFS Transmission of the complete message