**3GPP TSG-RAN WG2 Meeting #109-e *R2-200xxxx***

**Electronic meeting, 24th February – 6th March 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **1476** | **rev** | **-** | **Current version:** | **15.8.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Running CR for 38.331 for CA&DC enh |
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| ***Source to WG:*** | Rapporteur (Ericsson) |
| ***Source to TSG:*** | RAN2 |
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| ***Work item code:*** | LTE\_NR\_DC\_CA\_enh-Core |  | ***Date:*** | 2020-02-17 |
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| ***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)* |
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| ***Reason for change:*** | To capture the RAN2 agreements on LTE\_NR\_DC\_CA\_enh-Core WI:**RAN2#105 agreements**:*Agreements for fast SCell activation:** 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 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:** 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.
* 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.
* For NR INACTIVE, the network can request early measurement report in RRCResume
* For NR INACTIVE, early measurement reporting can be sent in RRCResumeComplete
* NR early measurements can be configured in both NR RRCRelease message and NR system information
* 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

*Agreements for MCG fast recovery:** MCG fast recovery targets all MRDC architecture options
* 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.* 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:

 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* 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 early measurements:** A single early measurement configuration is provided in SI for idle and inactive

*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
* 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.

**RAN2#107bis agreements***Agreements for early measurements:** The RRC release message can include SSB measurement configuration. It is assumed that information provided for cell reselection by broadcast is not provided in the RRC release message.
* If the UE has not received a dedicated SSB configuration, the UE does early measurements based on SIB.
* The UE only needs to support the following signalling combination options:
	+ A. If network uses broadcast signaling for the list of early measurements, it will provide all parameters by broadcast signaling with the only exception that dedicated signalling is used for the timer
	+ B. If network uses dedicated signaling for the list of early measurements, the following signalling options are allowed for each of the frequencies:
		- 1) SSB measurement configuration (incl SMTC) and all other parameters are provided by dedicated signaling
		- 2) SSB measurement configuration (incl SMTC) is broadcast and all other parameters are provided by dedicated signaling

*Agreements for MCG SCell and SCG configuraiton with RRC Resume:** Direct SCell activation (setting the SCell state to activated or deactivated) in resume message is supported, if R4 can confirm that there are no blocking issues from their point of view

*Agreements for MCG fast recovery:** For MCG fast recovery via SRB3, the MCGFailureInformation message in UL is encapsulated in the ULInformationTransferMRDC message
* A new RRC message, i.e., DLInformationTransferMRDC, is introduced in order to allow the SN to encapsulate (for SRB3) the MN response (i.e., RRCReconfiguration or RRCRelease message) to be send to the UE
* The RRC procedure on these encapsulated messages are the same as if they had been received by SRB1
* When receiving a MN RRCRelease message encapsulated within an SN RRC message via SRB3, the UE does not send any complete message.
* Split SRB1 is always used for the transmission of the MCGFailureInformation message. SRB3 is used only if split SRB1 is not configured

**RAN2#108 agreements***Agreements for early measurements:** Upon entering RRC CONNECTED mode, the UE stops validity timer T331 (if running) and deletes the dedicated idle mode measurement configuration (if configured).
* After moving to another RAT due to inter-RAT cell reselection, the UE stops validity timer T331 (if running) and deletes the dedicated idle mode measurement configuration (if configured)
* While transition from NR INACTIVE mode to NR IDLE mode, the UE keeps the validity timer T331 (if running) and the dedicated idle mode measurement configuration (if configured), i.e. just continue.
* When UE reselects to a cell that is not part of the validity area, the UE stops the validity timer and also clears the entire early measurement configuration.
* For the early measurements during a 2-step resume:
	+ if RRCRelease does not include idle/inactive measurement configuration, the UE keeps the configuration and T331 continues running (i.e. no action);
	+ if RRCRelease includes idle/inactive measurement configuration, the new configuration completely replaces the old configuration (incl timer which would be started).
	+ if RRCRelease includes an release indication, the UE releases the old configuration, stops timer.
* The validity area is defined as a carrier list (which could be different from the carriers to be measured during RRC\_IDLE/INACTIVE) with optional PCI list per carrier.
* The early measurement results are sorted by RSRP unless only RSRQ is configured as reporting quantity.
* If, for a frequency for which SSB config was provided by broadcast @ initial configuration, reselected cell does not broadcast SSB config the UE is not required to measure concerned frequency while camping on concerned cell (but should re-attempt following another re-selection)

*Agreements for MCG fast recovery:** The guard timer for fast MCG link recovery should be configured via dedicated signalling, it is configured by the MN.
* The configuration of guard timer implicitly indicates that the feature of fast MCG link recovery is enabled by the network, and that the UE shall initiate the procedure.

Agreements for cross-carrier scheduling with different numerology:* Updated based on the agreed changes in CR (R2-1916583)

Agreements for NR-DC power control:* Updated based on the agreed changes in CR (R2-1916643)
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| ***Summary of change:*** | **After RAN2#105bis:*** Added procedures and ASN.1 to enable SCells to be configured in deactivated o activated state upon addition or after handover. (5.3.5.5.2, 5.3.5.5.9, 6.3.2)
* Added placeholder for idle/inactive measurement (5.7.x)

**After RAN2#106:*** Modified the RRC Setup procedure to make it possible for the UE to indicate the availability of early measurement results in the *RRCResumeComplete* message (5.3.3.4)
* Added that MCG transmission will be resumed on reception RRC reconfiguration with sync (5.3.5.5.2)
* Modified the Inability to comply with RRC Reconfiguartion procedure so that SCG failure information procedure is triggered only if MCG is not suspended, otherwise re-establishement is triggered (5.3.5.8.2)
* Modified the Reconfiguration with sync failure procedure so that SCG failure information procedure is triggered only if MCG is not suspended, otherwise re-establishement is triggered (5.3.5.8.3)
* Modified the RRC Release procedure to include configuring the UE with early measurements (5.3.8.3)
* 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 (5.3.10.3)
* Modified the RRC Resume procedure to make it possible for the UE to include early measurement results in the *RRCResumeComplete* message if the network has requested that in the *RRCResume*, or otherwise indicate the availability of the early measurements (5.3.13.4)
* Clarified that SCG failure information procedure is triggered only if MCG is not suspended (5.7.3.1)
* Added MCG failure information procedure (5.7.y)
* Added UE Information procedure (5.7.z)
* Added the *ueInformationRequest* message structure in *DL-DCCH-Message* (6.2.1)
* Added the *mcgFailureInformation* and *ueInformationResponse* message structures in *UL-DCCH-Message* (6.2.1)
* Added ASN.1 for *MCGFailureInformation* (6.2.2)
* Modified ASN.1 for *RRCRelease* to include idle meas configuraiton(6.2.2)
* Modified ASN.1 for *RRCResume* to include early measurement request(6.2.2)
* Modified ASN.1 for *RRCResumeComplete* to include early measurement availability indication or early measurement results(6.2.2)
* Modified ASN.1 for *RRCSetupComplete* to include early measurement availability indication (6.2.2)
* Added ASN.1 for *UEInformationRequest* (6.2.2)
* Added ASN.1 for *UEInformationResponse* (6.2.2)
* Added ASN.1 for *MeasIdleConfig* (6.3.2)
* Added a placeholder for the *measIdleDuration* timer in the timers descriptions (7.1.1.)
* Added the UE variables *varMeasIdleConfig* and *varMeasIdleReport* (7.4)

**After RAN2#107:*** Modified RRC connection establishment procedures to stop T331 and release VarMeasIdleConfig upon reception of *RRCSetup* message
* Modified initiation of RRC Resume procedures to only release MR-DC if UE doesn’t support restoring SCG in RRCResume
* Modified initiation of RRC Resume procedures to only release MCG SCells if UE doesn’t support restoring MCG SCells in *RRCResume*
* Modified procedures for reception of *RRCResume* to release MR-DC if *RRCResume* doesn’t include *restoreSCG*
* Added procedures to reception of *RRCResume* to configure SCG with *RRCResume*
* Modified procedures for reception of *RRCResume* to release MCG SCells if *RRCResume* doesn’t include *restoreMCG-SCells*
* Added note to procedures for reception of *RRCReject* stating that the UE continues to perform idle mode measurements while T331 is running.
* Added procedures for T331 expiry
* Added procedure and ASN.1 for new SIB containing broadcast early measurement configuration.
* Modified ASN-1 to add new DL-DCCH message (*DLInformationTransferMRDC*) to carry the MN response to MCGFailure via SRB3
* Modified ASN.1 to update condition of measIdleConfig in RRCRelease from Need FFS to Need M
* Modified ASN.1 for *RRCResume* to inlcude indication to restore MCG SCells
* Modified ASN.1 for *RRCResume* to inlcude indication to restore SCG
* Modified ASN.1 for *RRCResume* to inlcude configuraitons for SCG
* Modified ASN.1 for *ULInformationTransferMRDC* to inlcude *MCGFailureInformation* message in UL-DCCH-Message and allow it to be sent via SRB3
* Modified ASN.1 to add UE capability to support keeping MCG SCells during RRC Resume
* Modified ASN.1 to add UE capability to support keeping SCG during RRC Resume
* Added procedure and ASN.1 for measurement results in *MCGFailureInformation* message
* Added clarification that UE continues idle mode measurements if it receives an *RRCReject* message
* Added indication about NW support for idle mode measurements to SIB1
* Added measurement configuration details (for NR and E-UTRA) to *MeasIdleConfig*
* Added MeasResultListIdle containing the Rel-16 idle mode measurement results
* Extended UE variables with idle mode measurement variables

**After RAN2#107bis:*** ***MCG failure recovery aspects:***
	+ Regarding guard timer/configurability/capability for MCG recovery
		- Added T316 in the *RLF*-*TimersAndConstants,*
		- FFSs if it is needed to be added in the SIB (*UE*-*TimersAndConstants)*
		- FFSs if there is a need to explictly configure MCG failure recovery or implicit configuration is sufficient via configuring/not configuring T316
		- FFSs if there is a need to have a capability indication for MCG failure recovery
	+ Clarified the re-establishment procedure triggering aspect (i.e. differentiation which triggers apply only for the cases where fast MCG recovery is configured) and also added the expiry of T316 as one of the conditions for triggering re-establishment.
	+ Clarified in the RLF detection procedure that the UE considers RLF as detected even if MCG failure recovery is configured
	+ Added a check that MCG failure recovery procedure is initiated if the UE was configured to perform it.
	+ Added procedure on how to send MCG failure information via SRB3
* ***MCG SCell and SCG configuraiton/restore with RRC Resume***
	+ Added lines in the SCell Addition/modification to cover for the case of SCell state indication in RRCResume
	+ Updated the resume procedure to avoid the restoring and then releasing of MCG SCells and/or SCG doesn’t happen if the network doesn’t indicate the UE to restore them ((i.e. restore only after checking the resume message).
	+ The state of the SCells that are restored set initially to deactivated.
* ***Early measurements***
	+ SIB handling procedures updated to address early measurement configurations
	+ Added the idle/inactive measurement procedure
	+ Updated the ASN.1 for the IEs and UE variables for idle/inactive measurement configurations and results (and also corresponding references in procedures)

**After RAN2#108:*** ***early measurements:***
* In general UE requirements regarding system information, included that UE is required to read SIBx if UE is configured for idle/inactive measurements
* Procedure text added in SIB4/x handling (5.2.2.4.5/x) to ensure that SSB configuration stored from a previous cell will not be reused in the current cell, related FFSs and NOTEs removed.
* Setup procedure (5.3.3.4) updated by removing the action to delete the idle/inactive measurement configuration (stopping T331 already deletes the configuration)
* Updated the procedure of handling the *measIdleConfig* reception in *RRCRelease* (5.3.8.3), including the validity area handling, and removed related FFS.
* When going to IDLE (5.3.11), T331 is kept running, unless going to IDLE was triggered by inter-RAT re-selection, in which case T331 is stopped.
* Updated the idle/inactive measuremnt procedure (5.7.x):
	+ measurement confgiuration released on T331 stoppage
	+ ensured measurement not performed if SSB-config is not available
	+ Applied on how the sorting for idle/inactive measurement cell/beam results is done (5.7.x.2)
	+ Captured the procedure for handling the validity area
	+ The handling of SCG CA check removed and an FFS added
	+ Updated the T331 expiry section (5.7.x.3) to also cover the T331 stoppage case (i.e. also delete idle/inactive
* RRCRelease message updated, to use the SetupRelease structure for the idle/inactive measurement configuration
* sibx included in SystemInformation-IEs
* MeasIdleConfigDedicated
	+ The need codes for the fields updated (Need N)
	+ ValidityArea signaling captured (earlier FFS removed)
* ***MCG failure recovery:***
* Removed FFSs regarding the need for guard timer in SIB signaling (5.3.5.5.6, 5.3.5.5.7, 5.3.5.11)
* Changed defintion of T316 in RLF-TimersAndConstants to use SetupRelease structure and also addition a need condition *MCG-Only* for it.
* Procedure text in RLF timers and constants configuration handling (5.3.5.5.6) updated to proplery handle t316 configurations
* Procedure handling of T304 expiry (5.3.5.8.3) updated to ensure that SCG failure informatin will not be triggered while fast MCG failure recovery is ongoing
* Included additional causes for re-establishment initiation in 5.3.7.2, i.e. SCG configuration failure while MCG is suspended in NR-DC and SCG change failure while MCG is suspended in NE-DC,
* Update MCG failure information procedure (5.7.y)
	+ Clarified that MCG failure recovery is not initiated while T316 is running
	+ SRB0 is not suspended
	+ How to populate the NR measurement results is added
	+ Clarified that the EUTRA measurements can be included indpendent of the DC case (as long as the UE is configured to measure them)
* ***Cross-Carrier Scheduling with different numerologies:***
* *PhysicalCellGroupConfig, NZP-CSI-RS-ResourceSet* and *CrossCarrierSchedulingConfig* updated.
* ***NR-DC Power Control:***
* *CG-Config CG-ConfigInfo* inter-node messages updated with the proper fields to enable NR-DC power coordination between FR1/FR2 (as agreed in R2-1916643)

 ***- SCell dormancy:**** *CellGroupConfig* and *ServingCellConfig* updated to inclued SCell dormancy configuration

 ***- MCG SCell and SCG configuraiton/restore with RRC Resume, Other aspects:**** Procedure handling of SCell Addition/Modification (5.3.5.5.9) clarified regarding on the direct SCell state indication during resume
* Procedure text updated in RRCReconfiguraiton handling (5.3.5.3) to handle the complete message for the RRCResume message that contains an SCG configuration
* Updated reception of connection resume procedure (5.3.13.4)
	+ stop T331,
	+ re-arrange order of processing of secondary cell group and radio bearer config
	+ handling of the RRC reconfiguration complete message, in case SCG config was included in the resume message
* RRCResumeComplete updated to inclue the SCG response (i.e. complete message for the SCG configuration)
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| ***Consequences if not approved:*** | Rel-16 DC/CA enhancements such as early measurements for fast CA/DC setup, SCG/SCell resume, direct SCell state configuration in handover/addition/resume, fast MCG failure recovery, and cross carrier scheduling with different numerologies will not be supported. |
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| ***Clauses affected:*** | 5.2.2.1 General UE requirements (System information acquisition)5.2.2.4.5 Actions upon reception of SIB45.2.2.4.x Actions upon reception of SIBx5.3.3.4 Reception of RRCSetup by the UE5.3.5.3 Reception of RRCReconfiguration by the UE5.3.5.5.2 Reconfiguration with sync5.3.5.5.6 RLF Timers & Constants configuration5.3.5.5.9 SCell Addition/Modification5.3.5.8.2 Inability to comply with RRCReconfiguration5.3.5.8.3 T304 expiry (Reconfiguration with sync failure)5.3.7.2 RRC Connection re-establishment (initiation) 5.3.8.3 Reception of the RRCRelease by the UE5.3.10.3 Detection of radio link failure5.3.11 UE actions upon going to RRC\_IDLE5.3.13.2 RRC Connection Resume (Initiation)5.3.13.3 Actions related to transmission of RRCResume5.3.13.4 Reception of the RRCResume by the UE5.3.15.2 Reception of the RRCReject by the UE5.7.2a UL Information transfer for MR-DC5.7.3.2 SCG failure information (Initiation)5.7.x Idle/Inactive measurements 5.7.y MCG failure information5.7.z UE Information5.7.2y DL information transfer for MR-DC6.2.1 General message structure (*DL-DCCH-Message, UL-DCCH-Message*)6.2.2 Message definitions (*DLInformationTransferMRDC*, *MCGFailureInformation, RRCRelease, RRCResume, RRCResumeComplete, RRCSetupComplete, SystemInformation,* SIB1, *UEInformationRequest, UEInformationResponse, ULInformationTransferMRDC*)6.3.1 System information blocks (*SIBx*)6.3.2 Radio resource control information elements (*CellGroupConfig, CrossCarrierSchedulingConfig, MeasIdleConfig, MeasResultIdleEUTRA, MeasResultIdleNR, NZP-CSI-RS-ResourceSet, PhysicalCellGroupConfig*, *RLF-TimersAndConstants, ServingCellConfig*)6.4 RRC multiplicity and type constraint values (*Multiplicity and type constraint definitions*)7.1.1 Timers (Informative)7.4 UE variables (*NR-UE-Variables*, *VarMeasIdleConfig, VarMeasIdleReport*)11.2.2 Inter-Node Message defintions (*CG-Config, CG-ConfigInfo*)B.1 Protection of RRC messages |
|  |  |
|  | **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

## 5.2 System information

### 5.2.2 System information acquisition

#### 5.2.2.1 General UE requirements



Figure 5.2.2.1-1: System information acquisition

The UE applies the SI acquisition procedure to acquire the AS- and NAS information. The procedure applies to UEs in RRC\_IDLE, in RRC\_INACTIVE and in RRC\_CONNECTED.

The UE in RRC\_IDLE and RRC\_INACTIVE shall ensure having a valid version of (at least) the *MIB*, *SIB1* through *SIB4, SIB5* (if the UE supports E-UTRA)and *SIBx* (if the UE is configured for idle/inactive measurements).

END OF CHANGES

START OF CHANGES

#### 5.2.2.4 Actions upon receipt of System Information

##### 5.2.2.4.5 Actions upon reception of *SIB4*

Upon receiving *SIB4* the UE shall:

1> if in RRC\_IDLE, or in RRC\_INACTIVE or in RRC\_CONNECTED while T311 is running:

2> for each entry in the *interFreqCarrierFreqList*:

3> select the first frequency band in the *frequencyBandList*, and *frequencyBandListSUL*, if present, which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *NR-NS-PmaxList*, if present:

3> if, the frequency band selected by the UE in *frequencyBandList* to represent a non-serving NR carrier frequency is not a downlink only band:

4> if, for the selected frequency band, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandList*:

5> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList*;

5> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

6> apply the *additionalPmax*;

5> else:

6> apply the *p-Max*;

5> if *frequencyBandListSUL is present in SIB4* and, for the frequency band selected in *frequencyBandListSUL*, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within *FrequencyBandListSUL*:

6> apply the first listed *additionalSpectrumEmission* which it supports among the values inlcuded in *NR-NS-PmaxList* within *frequencyBandListSUL*;

6> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

7> apply the *additionalPmax*;

6> else:

7> apply the *p-Max*;

5> else:

6> apply the *p-Max*;

4> else:

5> apply the *p-Max*;

2> if in RRC\_IDLE or RRC\_INACTIVE and the UE has a stored *VarMeasIdleConfig*:

3> for each entry in *measIdleCarrierListNR* within *VarMeasIdleConfig* that does not contain an *ssb-MeasConfig* received from the *RRCRelease* message:

4> if there is an entry in *interFreqCarrierFreqList* with the same *carrierFreqNR* and *ssbSubcarrierSpacing* as the entry in *measIdleCarrierListNR* within *VarMeasIdleConfig*:

5> store or replace the SSB measurement configuration from SIB4 in to *ssb-MeasConfig* of the corresponding entry in *measIdleCarrierListNR* within *VarMeasIdleConfig*;

4> else if there is no entry in *measIdleCarrierListNR* in *measIdleConfigSIB* of SIBx that has the same *carrierFreqNR* and *ssbSubcarrierSpacing* as the entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*:

5> remove the *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*, if stored;

*END OF CHANGES*

START OF CHANGES

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

Upon receiving *SIBx*, the UE shall:

1> if in RRC\_IDLE or RRC\_INACTIVE and the UE has a stored *VarMeasIdleConfig*:

2> if the *VarMeasIdleConfig* contains a *measIdleCarrierListNR* received from the *RRCRelease* message:

3> for each entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig* that does not contain an *ssb-MeasConfig* received from the *RRCRelease* message:

4> if there is an entry in *measIdleCarrierListNR* in *measIdleConfigSIB* that has the same *carrierFreqNR* as the entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig* and that contains *ssb-MeasConfig*:

5> store or replace the ssb-MeasConfig of the entry in the measIdleCarrierListNR in measIdleConfigSIB within VarMeasIdleConfig;

2> if the *VarMeasIdleConfig* does not contain a *measIdleCarrierListNR* or *measIdleCarrierListEUTRA* received from the *RRCRelease* message:

3> if the *measIdleConfigSIB* is included and contains *measIdleCarrierListNR*:

4> store or replace the *measIdleCarrierListNR* of *measIdleConfigSIB* within *VarMeasIdleConfig*;

3> else:

4> remove the *measIdleCarrierListNR* in *VarMeasIdleConfig*, if stored.

3> if the *measIdleConfigSIB* is included and contains *measIdleCarrierListEUTRA*:

4> store or replace the *measIdleCarrierListEUTRA* of *measIdleConfigSIB* within *VarMeasIdleConfig*;

3> else:

4> remove the *measIdleCarrierListEUTRA* in *VarMeasIdleConfig*, if stored.

*END OF CHANGES*

START OF CHANGES

## 5.3 Connection control

### 5.3.3 RRC connection establishment

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

The UE shall perform the following actions upon reception of the *RRCSetup*:

1> if the *RRCSetup* is received in response to an *RRCReestablishmentRequest*; or

1> if the *RRCSetup* is received in response to an *RRCResumeRequest* or *RRCResumeRequest1*:

2> discard any stored UE Inactive AS context and *suspendConfig*;

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

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

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

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

2> stop timer T380, if running;

1> perform the cell group configuration procedure in accordance with the received *masterCellGroup* and as specified in 5.3.5.5;

1> perform the radio bearer configuration procedure in accordance with the received *radioBearerConfig* and as specified in 5.3.5.6;

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

1> stop timer T300, T301 or T319 if running;

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if T302 is running:

2> stop timer T302;

2> perform the actions as specified in 5.3.14.4;

1> stop timer T320, if running;

1> if the *RRCSetup* is received in response to an *RRCResumeRequest*, *RRCResumeRequest1* or *RRCSetupRequest*:

2> if T331 is running:

3> stop timer T331;

3> perform the actions as specified in 5.7.x.3;

2> enter RRC\_CONNECTED;

2> stop the cell re-selection procedure;

1> consider the current cell to be the PCell;

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

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

3> if the *RRCSetup* is received in response to an *RRCSetupRequest*:

4> set the *ng-5G-S-TMSI-Value* to *ng-5G-S-TMSI-Part2*;

3> else:

4> set the *ng-5G-S-TMSI-Value* to *ng-5G-S-TMSI*;

2> set the *selectedPLMN-Identity* to the PLMN selected by upper layers (TS 24.501 [23]) from the PLMN(s) included in the *plmn-IdentityList* in *SIB1*;

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

3> include and set the *registeredAMF* as follows:

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

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

4> set the *amf-Identifier* to the value received from upper layers;

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

2> if upper layers provide one or more S-NSSAI (see TS 23.003 [21]):

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

2> set the *dedicatedNAS-Message* to include the information received from upper layers;

2> if the SIB1 contains *idleModeMeasurements* and the UE has idle/inactive measurement information available in *VarMeasIdleReport*:

3> include the *idleMeasAvailable*;

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

*END OF CHANGES*

START OF CHANGES

### 5.3.5 RRC reconfiguration

#### 5.3.5.3 Reception of an *RRCReconfiguration* by the UE

The UE shall perform the following actions upon reception of the *RRCReconfiguration*:

1> if the *RRCReconfiguration* is received via other RAT (i.e., inter-RAT handover to NR):

2> if the *RRCReconfiguration* does not include the *fullConfig* and the UE is connected to 5GC (i.e., delta signalling during intra 5GC handover):

3> re-use the source RAT SDAP and PDCP configurations if available (i.e., current SDAP/PDCP configurations for all RBs from source E-UTRA RAT prior to the reception of the inter-RAT HO *RRCReconfiguration* message);

1> else:

2> if the RRCReconfiguration includes the fullConfig:

3> perform the full configuration procedure as specified in 5.3.5.11;

1> if the *RRCReconfiguration* includes the *masterCellGroup*:

2> perform the cell group configuration for the received *masterCellGroup* according to 5.3.5.5;

1> if the *RRCReconfiguration* includes the *masterKeyUpdate*:

2> perform AS security key update procedure as specified in 5.3.5.7;

1> if the *RRCReconfiguration* includes the *sk-Counter*:

2> perform security key update procedure as specified in 5.3.5.7;

1> if the *RRCReconfiguration* includes the *secondaryCellGroup*:

2> perform the cell group configuration for the SCG according to 5.3.5.5;

1> if the *RRCReconfiguration* includes the *mrdc-SecondaryCellGroupConfig:*

2> if the *mrdc-SecondaryCellGroupConfig* is set to *setup*:

3> if the *mrdc-SecondaryCellGroupConfig* includes *mrdc-ReleaseAndAdd*:

4> perform MR-DC release as specified in clause 5.3.5.10;

3> if the received *mrdc-SecondaryCellGroup* is set to *nr-SCG*:

4> perform the RRC reconfiguration according to 5.3.5.3 for the *RRCReconfiguration* message included in *nr-SCG*;

3> if the received *mrdc-SecondaryCellGroup* is set to *eutra-SCG*:

4> perform the RRC connection reconfiguration as specified in TS 36.331 [10], clause 5.3.5.3 for the *RRCConnectionReconfiguration* message included in *eutra-SCG*;

2> else (*mrdc-SecondaryCellGroupConfig* is set to *release*):

3> perform MR-DC release as specified in clause 5.3.5.10;

1> if the *RRCReconfiguration* message includes the *radioBearerConfig*:

2> perform the radio bearer configuration according to 5.3.5.6;

1> if the *RRCReconfiguration* message includes the *radioBearerConfig2*:

2> perform the radio bearer configuration according to 5.3.5.6;

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

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

1> if the *RRCReconfiguration* message includes the *dedicatedNAS-MessageList*:

2> forward each element of the *dedicatedNAS-MessageList* to upper layers in the same order as listed;

1> if the *RRCReconfiguration* message includes the *dedicatedSIB1-Delivery*:

2> perform the action upon reception of *SIB1* as specified in 5.2.2.4.2;

1> if the *RRCReconfiguration* message includes the *dedicatedSystemInformationDelivery*:

2> perform the action upon reception of System Information as specified in 5.2.2.4;

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

2> perform the other configuration procedure as specified in 5.3.5.9;

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

2> if the *RRCReconfiguration* includes the *masterCellGroup* containing the *reportUplinkTxDirectCurrent*; or

2> if the *RRCReconfiguration* includes the *secondaryCellGroup* containing the *reportUplinkTxDirectCurrent*:

3> include the *uplinkTxDirectCurrentList* for each serving cell with UL;

3> if UE is configured with SUL carrier:

4> include *uplinkDirectCurrentBWP-SUL* for each serving cell with SUL within the *uplinkTxDirectCurrentList*;

2> if the *RRCReconfiguration* message includes the *mrdc-SecondaryCellGroupConfig* with *mrdc-SecondaryCellGroup* set to *eutra-SCG*:

3> include in the *eutra-SCG-Response* the E-UTRA *RRCConnectionReconfigurationComplete* message in accordance with TS 36.331 [10] clause 5.3.5.3;

2> if the *RRCReconfiguration* message includes the *mrdc-SecondaryCellGroupConfig* with *mrdc-SecondaryCellGroup* set to *nr-SCG*:

3> include in the *nr-SCG-Response* the *RRCReconfigurationComplete* message;

2> if the *RRCReconfiguration* message was included in an *RRCResume* message:

3> include the *RRCReconfigurationComplete* message in the *nr-SCG-Response* within the *scg-Response* in the *RRCResumeComplete* message;

2> if the *RRCReconfiguration* message was included in E-UTRA *RRCConnectionResume* message:

3> include the *RRCReconfigurationComplete* message in the E-UTRA MCG RRC message *RRCConnectionResumeComplete* in accordance with TS 36.313 [10], clause 5.3.3.4a;

1> if the UE is configured with E-UTRA *nr-SecondaryCellGroupConfig* (MCG is E-UTRA):

2> if the *RRCReconfiguration* message was received via SRB1:

3> submit the *RRCReconfigurationComplete* via the E-UTRA MCG embedded in E-UTRA RRC message *RRCConnectionReconfigurationComplete* as specified in TS 36.331 [10], clause 5.3.5.3/5.3.5.4;

3> if *reconfigurationWithSync* was included in *spCellConfig* of an SCG:

4> initiate the Random Access procedure on the SpCell, as specified in TS 38.321 [3];

3> else:

4> the procedure ends;

NOTE 1: The order the UE sends the *RRCConnectionReconfigurationComplete* message and performs the Random Access procedure towards the SCG is left to UE implementation.

2> else (*RRCReconfiguration* was received via SRB3):

3> if the *RRCReconfiguration* message was received within *DLInformationTransferMRDC*:

4> submit the *RRCReconfigurationComplete* via the E-UTRA MCG embedded in E-UTRA RRC message *RRCConnectionReconfigurationComplete* as specified in TS 36.331 [10], clause 5.3.5.3/5.3.5.4;

3> else (i.e. the *RRCReconfiguration* message was not received within *DLInformationTransferMRDC*):

4> submit the *RRCReconfigurationComplete* message via SRB3 to lower layers for transmission using the new configuration;

NOTE 2: In (NG)EN-DC and NR-DC, in the case *RRCReconfiguration* is received via SRB1, the random access is triggered by RRC layer itself as there is not necessarily other UL transmission. In the case *RRCReconfiguration* is received via SRB3, the random access is triggered by the MAC layer due to arrival of *RRCReconfigurationComplete*.

1> else if the *RRCReconfiguration* message was received via SRB1 within the *nr-SCG* within *mrdc-SecondaryCellGroup* (NR SCG RRC Reconfiguration):

2> if *reconfigurationWithSync* was included in *spCellConfig* in *nr-SCG*:

3> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3];

2> else

3> the procedure ends;

NOTE 2a: The order in which the UE sends the *RRCReconfigurationComplete* message and performs the Random Access procedure towards the SCG is left to UE implementation.

1> else if the *RRCReconfiguration* message was received via SRB3:2> if the *RRCReconfiguration* message was received within *DLInformationTransferMRDC*:

3> if the *RRCReconfiguration* message was received within the *nr-SCG* within *mrdc-SecondaryCellGroup* (NR SCG RRC Reconfiguration):

4> if *reconfigurationWithSync* was included in *spCellConfig* in nr-SCG:

5> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3];

4> else:

5> the procedure ends;

3> submit the *RRCReconfigurationComplete* message via SRB1 to lower layers for transmission using the new configuration;

2> else if the *RRCReconfiguration* message was not received within *DLInformationTransferMRDC*:

3> submit the *RRCReconfigurationComplete* message via SRB3 to lower layers for transmission using the new configuration;

1> else(MCG RRCReconfiguration via SRB1):

2> submit the *RRCReconfigurationComplete* message via SRB1 to lower layers for transmission using the new configuration;

2> if this is the first *RRCReconfiguration* message after successful completion of the RRC re-establishment procedure:

3> resume SRB2 and DRBs that are suspended;

1> if *reconfigurationWithSync* was included in *spCellConfig* of an MCG or SCG, and when MAC of an NR cell group successfully completes a Random Access procedure triggered above;

2> stop timer T304 for that cell group;

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

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

2> if the *reconfigurationWithSync* was included in *spCellConfig* of an MCG:

3> if T390 is running:

4> stop timer T390 for all access categories;

4> perform the actions as specified in 5.3.14.4.

3> if *RRCReconfiguration* does not include *dedicatedSIB1-Delivery* and

3> if the active downlink BWP, which is indicated by the *firstActiveDownlinkBWP-Id* for the target SpCell of the MCG, has a common search space configured by *searchSpaceSIB1*:

4> acquire the *SIB1*, which is scheduled as specified in TS 38.213 [13], of the target SpCell of the MCG;

4> upon acquiring *SIB1*, perform the actions specified in clause 5.2.2.4.2;

2> if *reconfigurationWithSync* was included in *masterCellGroup*; and

2> if the UE transmitted a *UEAssistanceInformation* message during the last 1 second:

3> initiate transmission of a *UEAssistanceInformation* message with the same contents;

2> the procedure ends.

NOTE 3: The UE is only required to acquire broadcasted *SIB1* if the UE can acquire it without disrupting unicast data reception, i.e. the broadcast and unicast beams are quasi co-located.

*END OF CHANGES*

START OF CHANGES

#### 5.3.5.5 Cell Group configuration

##### 5.3.5.5.2 Reconfiguration with sync

The UE shall perform the following actions to execute a reconfiguration with sync.

1> if the AS security is not activated, perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with the release cause '*other*' upon which the procedure ends;

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

1> start timer T304 for the corresponding SpCell with the timer value set to *t304*, as included in the *reconfigurationWithSync*;

1> if the *frequencyInfoDL* is included:

2> consider the target SpCell to be one on the SSB frequency indicated by the *frequencyInfoDL* with a physical cell identity indicated by the *physCellId*;

1> else:

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

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

1> apply the specified BCCH configuration defined in 9.1.1.1;

1> acquire the *MIB*, which is scheduled as specified in TS 38.213 [13];

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

NOTE 2: The UE may omit reading the *MIB* if the UE already has the required timing information, or the timing information is not needed for random access.

1> reset the MAC entity of this cell group;

1> consider the SCell(s) not included in the *SCellsToAddModList* of this cell group in the received *RRCReconfiguration* message, if configured, to be in deactivated state;

1> apply the value of the *newUE-Identity* as the C-RNTI for this cell group;

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

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

1> if this cell group is the MCG:

2> stop timer T316, if running;

2> resume MCG transmission, if suspended.

*END OF CHANGES*

START OF CHANGES

##### 5.3.5.5.6 RLF Timers & Constants configuration

The UE shall:

1> if the received *rlf-TimersAndConstants* is set to *release*:

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

2> consider fast MCG link recovery is not available;

1> else:

2> (re-)configure the value of timers and constants in accordance with received *rlf-TimersAndConstants*;

2> stop timer T310 for this cell group, if running;

2> reset the counters N310 and N311;

2> if the *t316* is included and set to *setup:*

3> consider fast MCG link recovery is available;

2> else if the *t316* is included and set to *release:*

3> consider fast MCG link recovery is not available.

*END OF CHANGES*

START OF CHANGES

##### 5.3.5.5.9 SCell Addition/Modification

The UE shall:

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

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

2> if the *sCellState* is included and set to *activated*:

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

2> else:

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

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

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

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

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

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

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

2> if the *sCellToAddModList* was received within an *RRCResume* or an E-UTRA *RRCConnectionResume* message:

3> if the *sCellState* is included and set to *activated*:

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

3> else:

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

*END OF CHANGES*

START OF CHANGES

#### 5.3.5.8 Reconfiguration failure

##### 5.3.5.8.2 Inability to comply with *RRCReconfiguration*

The UE shall:

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

2> if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over SRB3;

3> continue using the configuration used prior to the reception of *RRCReconfiguration* message;

3> if MCG transmission is not suspended:

4> initiate the SCG failure information procedure as specified in subclause 5.7.3 to report SCG reconfiguration error, upon which the connection reconfiguration procedure ends;

3> else:

4> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7, upon which the connection reconfiguration procedure ends;

2> else, if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over SRB1;

3> continue using the configuration used prior to the reception of *RRCReconfiguration* message;

3> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7, upon which the connection reconfiguration procedure ends.

1> else if *RRCReconfiguration* is received via NR (i.e., NR standalone, NE-DC, or NR-DC):

2> if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over SRB3;

NOTE 0: This case does not apply in NE-DC.

3> continue using the configuration used prior to the reception of *RRCReconfiguration* message;

3> if MCG transmission is not suspended:

4> initiate the SCG failure information procedure as specified in subclause 5.7.3 to report SCG reconfiguration error, upon which the connection reconfiguration procedure ends;

3> else:

4> initiate the connection re-establishment procedure as specified in clause 5.3.7, upon which the connection reconfiguration procedure ends;

2> else if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over the SRB1;

NOTE 0a: The compliance also covers the SCG configuration carried within octet strings e.g. field *mrdc-SecondaryCellGroupConfig*. I.e. the failure behaviour defined also applies in case the UE cannot comply with the embedded SCG configuration or with the combination of (parts of) the MCG and SCG configurations.

3> continue using the configuration used prior to the reception of *RRCReconfiguration* message;

3> if AS security has not been activated:

4> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'other'

3> else if AS security has been activated but SRB2 and at least one DRB have not been setup:

4> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';

3> else:

4> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the reconfiguration procedure ends;

1> else if *RRCReconfiguration* is received via other RAT (Handover to NR failure):

2> if the UE is unable to comply with any part of the configuration included in the *RRCReconfiguration* message:

3> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT.

NOTE 1: The UE may apply above failure handling also in case the *RRCReconfiguration* message causes a protocol error for which the generic error handling as defined in clause 10 specifies that the UE shall ignore the message.

NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/failure.

*END OF CHANGES*

START OF CHANGES

##### 5.3.5.8.3 T304 expiry (Reconfiguration with sync Failure)

The UE shall:

1> if T304 of the MCG expires:

2> release dedicated preambles provided in *rach-ConfigDedicated* if configured;

2> revert back to the UE configuration used in the source PCell;

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

NOTE 1: In the context above, "the UE configuration" includes state variables and parameters of each radio bearer.

1> else if T304 of a secondary cell group expires:

2> if MCG transmission is not suspended:

3> release dedicated preambles provided in *rach-ConfigDedicated,* if configured;

3> initiate the SCG failure information procedure as specified in subclause 5.7.3 to report SCG reconfiguration with sync failure, upon which the RRC reconfiguration procedure ends;

2> else:

3> initiate the connection re-establishment procedure as specified in subclause 5.3.7;1> else if T304 expires when *RRCReconfiguration* is received via other RAT (HO to NR failure):

2> reset MAC;

2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT.

*END OF CHANGES*

START OF CHANGES

### 5.3.7 RRC connection re-establishment

#### 5.3.7.2 Initiation

The UE initiates the procedure when one of the following conditions is met:

1> upon detecting radio link failure of the MCG and fast MCG link recovery is not available (i.e. T316 is not configured), in accordance with 5.3.10; or

1> upon re-configuration with sync failure of the MCG, in accordance with sub-clause 5.3.5.8.3; or

1> upon mobility from NR failure, in accordance with sub-clause 5.4.3.5; or

1> upon integrity check failure indication from lower layers concerning SRB1 or SRB2, except if the integrity check failure is detected on the *RRCReestablishment* message; or

1> upon an RRC connection reconfiguration failure, in accordance with sub-clause 5.3.5.8.2; or

1> upon detecting radio link failure for the SCG while MCG transmission is suspended, in accordance with subclause 5.3.10.3 in NR-DC or in accordance with TS 36.331 [10] subclause 5.3.11.3 in NE-DC; or

1> upon reconfiguration with sync failure of the SCG while MCG transmission is suspended in accordance with subclause 5.3.5.8.3; or

1> upon SCG change failure while MCG transmission in NE-DC in accordance with TS 36.331 [10] subclause 5.3.5.7a; or1> upon SCG configuration failure while MCG transmission is suspended in accordance with subclause 5.3.5.8.2 in NR-DC or in accordance with TS 36.331 [10] subclause 5.3.5.5 in NE-DC; or

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

1> upon T316 expiry, in accordance with sub-clause 5.7.y.5.

Upon initiation of the procedure, the UE shall:

1> stop timer T310, if running;

1> stop timer T304, if running;

1> start timer T311;

1> stop timer T316, if running;

1> suspend all RBs, except SRB0;

1> reset MAC;

1> release the MCG SCell(s), if configured;

1> release *spCellConfig*, if configured;

1> if MR-DC is configured:

2> perform MR-DC release, as specified in clause 5.3.5.10;

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

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

1> perform cell selection in accordance with the cell selection process as specified in TS 38.304 [20], clause 5.2.6.

*END OF CHANGES*

START OF CHANGES

### 5.3.8 RRC connection release

#### 5.3.8.3 Reception of the *RRCRelease* by the UE

The UE shall:

1> delay the following actions defined in this sub-clause 60 ms from the moment the *RRCRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCRelease* message has been successfully acknowledged, whichever is earlier;

1> stop timer T380, if running;

1> stop timer T320, if running;

1> stop timer T316, if running;

1> if theAS security is not activated:

2> ignore any field included in *RRCRelease* message except *waitTime*;

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with the release cause 'other' upon which the procedure ends;

1> if the *RRCRelease* message includes *redirectedCarrierInfo* indicating redirection to *eutra*:

2> if *cnType* is included:

3> after the cell selection, indicate the available CN Type(s) and the received *cnType* to upper layers;

NOTE: Handling the case if the E-UTRA cell selected after the redirection does not support the core network type specified by the *cnType,* is up to UE implementation.

1> if the *RRCRelease* message includes the *cellReselectionPriorities*:

2> store the cell reselection priority information provided by the *cellReselectionPriorities*;

2> if the *t320* is included:

3> start timer T320, with the timer value set according to the value of *t320*;

1> else:

2> apply the cell reselection priority information broadcast in the system information;

1> if *deprioritisationReq* is included:

2> start or restart timer T325 with the timer value set to the *deprioritisationTimer* signalled;

2> store the *deprioritisationReq* until T325 expiry;

1> if the *RRCRelease* includes the *measIdleConfig*:

2> if T331 is running:

3> stop timer T331;

3> perform the actions as specified in 5.7.x.3;

2> if the *measIdleConfig* is set to *setup*:

3> store the received *measIdleDuration* in *VarMeasIdleConfig*;

3> start timer T331 with the value of *measIdleDuration*;

3> if the *measIdleConfig* contains *measIdleCarrierListNR*:

4> store the received *measIdleCarrierListNR* in *VarMeasIdleConfig*;

3> if the *measIdleConfig* contains *measIdleCarrierListEUTRA*:

4> store the received *measIdleCarrierListEUTRA* in *VarMeasIdleConfig*;

3> if the *measIdleConfig* contains *validityAreaList*:

4> store the received *validityAreaList* in *VarMeasIdleConfig*;

3> start performing idle/inactive measurements asspecified in5.7.x;

1> if the *RRCRelease* includes *suspendConfig*:

2> apply the received *suspendConfig*;

2> reset MAC and release the default MAC Cell Group configuration, if any;

2> re-establish RLC entities for SRB1;

2> if the *RRCRelease* message with *suspendConfig* was received in response to an *RRCResumeRequest* or an *RRCResumeRequest1*:

3> stop the timer T319 if running;

3> in the stored UE Inactive AS context:

4> replace the KgNB and KRRCint keys with the current KgNB and KRRCint keys;

4> replace the C-RNTI with the temporary C-RNTI in the cell the UE has received the *RRCRelease* message;

4> replace the *cellIdentity* with the *cellIdentity* of the cell the UE has received the *RRCRelease* message;

4> replace the physical cell identitywith the physical cell identity of the cell the UE has received the *RRCRelease* message;

2> else:

3> store in the UE Inactive AS Context the current KgNB and KRRCint keys, the ROHC state, the stored QoS flow to DRB mapping rules, the C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell, and all other parameters configured except for the ones within *ReconfigurationWithSync* and *servingCellConfigCommonSIB*;

2> suspend all SRB(s) and DRB(s), except SRB0;

2> indicate PDCP suspend to lower layers of all DRBs;

2> if the *t380* is included:

3> start timer T380, with the timer value set to *t380*;

2> if the *RRCRelease* message is including the *waitTime*:

3> start timer T302 with the value set to the *waitTime*;

3> inform upper layers that access barring is applicable for all access categories except categories '0' and '2';

2> if T390 is running:

3> stop timer T390 for all access categories;

3> perform the actions as specified in 5.3.14.4;

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

2> enter RRC\_INACTIVE and perform cell selection as specified in TS 38.304 [20];

1> else

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with the release cause 'other'.

*END OF CHANGES*

START OF CHANGES

### 5.3.10 Radio link failure related actions

#### 5.3.10.3 Detection of radio link failure

The UE shall:

1> upon T310 expiry in PCell; or

1> upon random access problem indication from MCG MAC while neither T300, T301, T304, T311 nor T319 are running; or

1> upon indication from MCG RLC that the maximum number of retransmissions has been reached:

2> if the indication is from MCG RLC and CA duplication is configured and activated, and for the corresponding logical channel *allowedServingCells* only includes SCell(s):

3> initiate the failure information procedure as specified in 5.7.5 to report RLC failure.

2> else:

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

3> if AS security has not been activated:

4> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'other';-

3> else if AS security has been activated but SRB2 and at least one DRB have not been setup:

4> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';

3> else:

4> if fast MCG link recovery is configured (i.e. T316 is configured); and

4> if SCG transmission is not suspended; and

4> if PSCell change is not ongoing (i.e. timer T304 for the NR PSCell is not running in case of NR-DC or timer T307 of the E-UTRA PSCell is not running as specified in TS 36.331 [10], clause 5.3.10.10, in NE-DC):

5> initiate the MCG failure information procedure as specified in 5.7.y to report MCG radio link failure.

4> else:

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

The UE shall:

1> upon T310 expiry in PSCell; or

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

1> upon indication from SCG RLC that the maximum number of retransmissions has been reached:

2> if the indication is from SCG RLC and CA duplication is configured and activated; and for the corresponding logical channel *allowedServingCells* only includes SCell(s):

3> initiate the failure information procedure as specified in 5.7.5 to report RLC failure.

2> else if 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 5.7.3 to report SCG radio link failure.

2> else:

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

3> if the UE is in NR-DC:

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

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

4> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7;

*END OF CHANGES*

START OF CHANGES

### 5.3.11 UE actions upon going to RRC\_IDLE

The UE shall:

1> reset MAC;

1> set the variable *pendingRNA-Update* to *false*, if that is set to *true*;

1> if going to RRC\_IDLE was triggered by reception of the *RRCRelease* message including a *waitTime*:

2> if T302 is running:

3> stop timer T302;

2> start timer T302 with the value set to the *waitTime*;

2> inform upper layers that access barring is applicable for all access categories except categories '0' and '2'.

1> else:

2> if T302 is running:

3> stop timer T302;

3> perform the actions as specified in 5.3.14.4;

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if the UE is leaving RRC\_INACTIVE:

2> if going to RRC\_IDLE was not triggered by reception of the *RRCRelease message*:

3> if stored, discard the cell reselection priority information provided by the *cellReselectionPriorities*;

3> stop the timer T320, if running;

1> stop all timers that are running except T302, T320, T325, and T331;

1> discard the UE Inactive AS context, if any;

1> release the *suspendConfig*, if configured;

1> discard the KgNB key, the S-KgNB key, the S-KeNB key, the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key, if any;

1> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity and SDAP for all established RBs;

1> indicate the release of the RRC connection to upper layers together with the release cause;

1> except if going to RRC\_IDLE was triggered by inter-RAT cell reselection while the UE is in RRC\_INACTIVE or RRC\_IDLE or when selecting an inter-RAT cell while T311 was running:

2> enter RRC\_IDLE and perform cell selection as specified in TS 38.304 [20];

1> if going to RRC\_IDLE was triggered by inter-RAT cell reselection while the UE is in RRC\_INACTIVE or RRC\_IDLE:

2> if T331 is running:

3> stop timer T331;

3> perform the actions as specified in 5.7.x.3;*END OF CHANGES*

START OF CHANGES

### 5.3.13 RRC connection resume

#### 5.3.13.2 Initiation

The UE initiates the procedure when upper layers or AS (when responding to RAN paging or upon triggering RNA updates while the UE is in RRC\_INACTIVE) requests the resume of a suspended RRC connection.

The UE shall ensure having valid and up to date essential system information as specified in clause 5.2.2.2 before initiating this procedure.

Upon initiation of the procedure, the UE shall:

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 5.3.14 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 5.3.14 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 RNA update as specified in 5.3.13.8:

2> if an emergency service is ongoing:

NOTE: How the RRC layer in the UE is aware of an ongoing emergency service is up to UE implementation.

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 5.3.14 using the selected Access Category and one or more Access Identities to be applied as specified in TS 24.501 [23];

3> if the access attempt is barred:

4> set the variable *pendingRNA-Update* to *true*;

4> the procedure ends;

1> if the UE is in NE-DC or NR-DC:

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

3> release the MR-DC related configurations (i.e., as specified in 5.3.5.10) from the UE Inactive AS context, if stored;

1> if the UE does not support maintaining the MCG SCell configurations upon connection resumption:2> release the MCG SCell(s) from the UE Inactive AS context, if stored;

1> apply the default L1 parameter values as specified in corresponding physical layer specifications, except for the parameters for which values are provided in *SIB1*;

1> apply the default SRB1 configuration as specified in 9.2.1;

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

1> release *delayBudgetReportingConfig* from the UE Inactive AS context, if stored;

1> stop timer T342, if running;

1> release *overheatingAssistanceConfig* from the UE Inactive AS context, if stored;

1> stop timer T345, if running;

1> apply the CCCH configuration as specified in 9.1.1.2;

1> apply the *timeAlignmentTimerCommon* included in *SIB1*;

1> start timer T319;

1> set the variable *pendingRNA-Update* to *false*;

1> initiate transmission of the *RRCResumeRequest* message or *RRCResumeRequest1* in accordance with 5.3.13.3.

#### 5.3.13.3 Actions related to transmission of *RRCResumeRequest* or *RRCResumeRequest1* message

The UE shall set the contents of *RRCResumeRequest* or *RRCResumeRequest1* message as follows:

1> if field *useFullResumeID* is signalled in *SIB1*:

2> select *RRCResumeRequest1* as the message to use;

2> set the *resumeIdentity* to the stored *fullI-RNTI* value;

1> else:

2> select *RRCResumeRequest* as the message to use;

2> set the *resumeIdentity* to the stored *shortI-RNTI* value;

1> restore the RRC configuration, RoHC state, the stored QoS flow to DRB mapping rules and the KgNB and KRRCint keys from the stored UE Inactive AS context except for the following:

* *masterCellGroup;*
* *mrdc-SecondaryCellGroup*, if stored; and
* *pdcp-Config*;

1> set the *resumeMAC-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) *VarResumeMAC-Input*;

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

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

1> derive the KgNB key based on the current KgNB key or the NH, using the stored *nextHopChainingCount* value, as specified in TS 33.501 [11];

1> derive the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key;

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

NOTE 1: Only DRBs with previously configured UP integrity protection shall resume integrity protection.

1> configure lower layers to apply 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;

1> re-establish PDCP entities for SRB1;

1> resume SRB1;

1> submit the selected message *RRCResumeRequest* or *RRCResumeRequest1* for transmission to lower layers.

NOTE 2: Only DRBs with previously configured UP ciphering shall resume ciphering.

If lower layers indicate an integrity check failure while T319 is running, perform actions specified in 5.3.13.5.

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

#### 5.3.13.4 Reception of the *RRCResume* by the UE

The UE shall:

1> stop timer T319;

1> stop timer T380, if running;

2> if T331 is running:

3> stop timer T331;

3> perform the actions as specified in 5.7.x.3;

1> if the *RRCResume* includes the *fullConfig*:

2> perform the full configuration procedure as specified in 5.3.5.11;

1> else:

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

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

2> if the *RRCResume* does not include the *restoreSCG*:

3> if the UE is in NE-DC or NR-DC:

4> release the MR-DC related configurations (i.e., as specified in 5.3.5.10) from the UE Inactive AS context, if stored;

2> restore the *masterCellGroup, mrdc-SecondaryCellGroup*, if stored, and *pdcp-Config* from the UE Inactive AS context;

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

1> discard the UE Inactive AS context;

1> release the *suspendConfig* except the *ran-NotificationAreaInfo*;

1> if the *RRCResume* includes the *masterCellGroup*:

2> perform the cell group configuration for the received *masterCellGroup* according to 5.3.5.5;

1> if the *RRCResume* includes the *mrdc-SecondaryCellGroup:*

2> if the received *mrdc-SecondaryCellGroup* is set to *nr-SCG*:

3> perform the RRC reconfiguration according to 5.3.5.3 for the *RRCReconfiguration* message included in *nr-SCG*;

2> if the received *mrdc-SecondaryCellGroup* is set to *eutra-SCG*:

3>perform the RRC connection reconfiguration as specified in TS 36.331 [10], clause 5.3.5.3 for the *RRCConnectionReconfiguration* message included in *eutra-SCG*;

Editor’s Note: FFS on the handling of synchronization and RA if the *RRCResume* contains the *restoreSCG* but no *mrdc-SecondaryCellGroup.*

1> if the *RRCResume* includes the *radioBearerConfig*:

2> perform the radio bearer configuration according to 5.3.5.6;

1> if the *RRCResume* message includes the *sk-Counter*:

2> perform security key update procedure as specified in 5.3.5.7;

1> if the *RRCResume* message includes the *radioBearerConfig2*:

2> perform the radio bearer configuration according to 5.3.5.6;

1> resume SRB2, SRB3 (if configured), and all DRBs;

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

1> stop timer T320, if running;

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

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

1> resume measurements if suspended;

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if T302 is running:

2> stop timer T302;

2> perform the actions as specified in 5.3.14.4;

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 the of *RRCResumeComplete* message as follows:

2> if the upper layer provides NAS PDU, set the *dedicatedNAS-Message* to include the information received from upper layers;

2> if the upper layer provides a PLMN, set the *selectedPLMN-Identity* to PLMN selected by upper layers (TS 24.501 [23]) from the PLMN(s) included in the *plmn-IdentityList* in *SIB1;*

2> if the *masterCellGroup* contains the *reportUplinkTxDirectCurrent*:

3> include the *uplinkTxDirectCurrentList* for each serving cell with UL;

3> if UE is configured with SUL carrier:

4> include *uplinkDirectCurrentBWP-SUL* for each serving cell with SUL within the *uplinkTxDirectCurrentList*;

2> if the UE has idle/inactive measurement information available in *VarMeasIdleReport*:

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

Editor’s note: FFS if the *idleModeMeasuremnetReq* indicates all results (EUTRA and NR), or can request only NR results. The procedure below assumes the former.

4> set the *measResultIdleEUTRA* in the *RRCResumeComplete* message to the value of *measReportIdleEUTRA* in the *VarMeasIdleReport,* if available;

4> set the *measResultIdleNR* in the *RRCResumeComplete* message to the value of *measReportIdleNR* in the *VarMeasIdleReport*, if available;

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

3> else if the SIB1 contains *idleModeMeasurements*:

4> include the *idleMeasAvailable*;

2> if the *RRCResume* message includes the *mrdc-SecondaryCellGroupConfig* with *mrdc-SecondaryCellGroup* set to *eutra-SCG*:

3> include in the *eutra-SCG-Response* the E-UTRA *RRCConnectionReconfigurationComplete* message in accordance with TS 36.331 [10] clause 5.3.5.3;

2> if the *RRCResume* message includes the *mrdc-SecondaryCellGroupConfig* with *mrdc-SecondaryCellGroup* set to *nr-SCG*:

3> include in the *nr-SCG-Response* the SCG *RRCReconfigurationComplete* message;

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

1> the procedure ends.

*END OF CHANGES*

START OF CHANGES

### 5.3.15 RRC connection reject

#### 5.3.15.2 Reception of the *RRCReject* by the UE

The UE shall:

1> stop timer T300, if running;

1> stop timer T319, if running;

1> stop timer T302, if running;

1> reset MAC and release the default MAC Cell Group configuration;

1> if *waitTime* is configured in the *RRCReject*:

2> start timer T302, with the timer value set to the *waitTime*;

1> if *RRCReject* is received in response to a request from upper layers:

2> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2';

1> if *RRCReject* is received in response to an *RRCSetupRequest*:

2> inform upper layers about the failure to setup the RRC connection, upon which the procedure ends;

1> else if *RRCReject* is received in response to an *RRCResumeRequest* or an *RRCResumeRequest1*:

2> if resume is triggered by upper layers:

3> inform upper layers about the failure to resume the RRC connection;

2> if resume istriggered due to an RNA update:

3> set the variable *pendingRNA-Update* to *true*;

2> discard the current KgNB key, the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key derived in accordance with 5.3.13.3;

2> suspend SRB1, upon which the procedure ends;

The RRC\_INACTIVE UE shall continue to monitor paging while the timer T302 is running.

NOTE: If configured, the UE shall continue to perform idle/inactive measurements while the timer T331 is running.

*END OF CHANGES*

START OF CHANGES

## 5.7 Other

### 5.7.2a UL information transfer for MR-DC

#### 5.7.2a.1 General



Figure 5.7.2a.1-1: UL information transfer MR-DC

The purpose of this procedure is to transfer MR-DC dedicated information from the UE to the network e.g. the NR or E-UTRA RRC *MeasurementReport*, *FailureInformation* or *MCGFailureInformation* message.

#### 5.7.2a.2 Initiation

A UE in RRC\_CONNECTED initiates the UL information transfer for MR-DC procedure whenever there is a need to transfer MR-DC dedicated information. I.e. the procedure is not used during an RRC connection reconfiguration involving NR or E-UTRA connection reconfiguration, in which case the MR DC information is piggybacked to the *RRCReconfigurationComplete* message.

#### 5.7.2a.3 Actions related to transmission of *ULInformationTransferMRDC* message

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

1> if there is a need to transfer MR-DC dedicated information related to NR:

2> set the *ul-DCCH-MessageNR* to include the NR MR-DC dedicated information to be transferred (e.g., NR RRC *MeasurementReport,* *FailureInformation,* or *MCGFailureInformation* message);

1> else if there is a need to tranfer MR-DC dedicated information related to E-UTRA:

2> set the *ul-DCCH-MessageEUTRA* to include the E-UTRA MR-DC dedicated information to be transferred (e.g., E-UTRA RRC *MeasurementReport, FailureInformation,* or *MCGFailureInformation* message);

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

*END OF CHANGES*

START OF CHANGES

### 5.7.3 SCG failure information

#### 5.7.3.2 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 subclause 5.3.10.3;

1> upon reconfiguration with sync failure of the SCG, in accordance with subclause 5.3.5.8.3;

1> upon SCG configuration failure, in accordance with subclause 5.3.5.8.2;

1> upon integrity check failure indication from SCG lower layers concerning SRB3.

Upon initiating the procedure, the UE shall:

1> suspend SCG transmission for all SRBs and DRBs;

1> reset SCG MAC;

1> stop T304 for the SCG, if running;

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

2> initiate transmission of the *SCGFailureInformationNR* message as specified in TS 36.331 [10], clause 5.6.13a.

1> else:

2> initiate transmission of the *SCGFailureInformation* message in accordance with 5.7.3.5.

*END OF CHANGES*

START OF CHANGES

### 5.7.x Idle/inactive Measurements

#### 5.7.x.1 General

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

#### 5.7.x.2 Initiation

While in RRC\_IDLE or RRC\_INACTIVE and T331 is running, the UE shall:

1> perform the measurements in accordance with the following:

2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListEUTRA*:

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

4> if UE supports dual connectivity between the serving carrier and the carrier frequency indicated by *carrierFreqEUTRA* within the corresponding entry:

Editor’s note: It is FFS if a check for SCG CA is to be performed (i.e. carrier not suitable for a PSCell but suitable for an SCG SCell with another carrier being measured that is suitable for PSCell)

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

5> if the *measCellListEUTRA* is included:

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

5> else:

6> consider the serving cell and up to *maxCellMeasIdle* strongest identified cells to be applicable for idle/inactive measurement reporting;

5> if the *reportQuantities* is set to *rsrq*:

6> consider RSRQ as the sorting quantity;

5> else:

6> consider RSRP as the sorting quantity;

5> store measurement results as indicated by *reportQuantities* for cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThreshold* (if any) within the *measReportIdleEUTRA* in *VarMeasIdleReport*;

2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListNR*:

3> for each entry in *measIdleCarrierListNR* within *VarMeasIdleConfig* that contains ssb-MeasConfig:

4> if UE supports carrier aggregation or dual connectivity between serving carrier and the carrier frequency and subcarrier spacing indicated by *carrierFreqNR* and *ssbSubCarrierSpacing* within the corresponding entry:

Editor’s note: It is FFS if a check for SCG CA is to be performed (i.e. carrier not suitable for a PSCell but suitable for an SCG SCell with another carrier being measured that is suitable for PSCell).

5> perform measurements in the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry;

5> if the *measCellListNR* is included:

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

5> else:

6> consider the serving cell and up to *maxCellMeasIdle* strongest identified cells to be applicable for idle/inactive measurement reporting;

5> if the *reportQuantities* is set to *rsrq*:

6> consider RSRQ as the sorting quantity;

5> else:

6> consider RSRP as the sorting quantity;

5> store measurement results as indicated by *reportQuantities* for cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThreshold* (if any) within the *measReportIdleNR* in *VarMeasIdleReport*;

5> if the *includeBeamMeasurements* is included:

6> if the *reportQuantityRS*-*Indexes* is set to *rsrq*:

7> consider RSRQ as the sorting quantity;

6> else:

7> consider RSRP as the sorting quantity;

6> store the beam measurement results as indicated by *reportQuantityRS*-*Indexes* within the *measReportIdleNR* in *VarMeasIdleReport*;

NOTE 1: The fields *s-NonIntraSearchP* and *s-NonIntraSearchQ* in *SIB2* 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 38.133 [14] are met for measurement reporting. UE is not required to perform idle/inactive measurements if the SIB1 does not contain *idleModeMeasurements*.

1> if *validityAreaList* is configured in *VarMeasIdleConfig*:

2> if the UE reselects to a serving cell on a frequency which does not match the *carrierFreq* of any entry in the *validityAreaList*;

3> stop timer T331;

3> perform the actions as specified in 5.7.x.3;

2> if the UE reselects to a serving cell on a frequency which matches the *carrierFreq* of any entry in the *validityAreaList*;

3> if *validityCellList* is included for the corresponding frequency and if the physical cell identity of the serving cell does not match any entry in *validityCellList*:

4> stop timer T331;

4> perform the actions as specified in 5.7.x.3.

#### 5.7.x.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 SIBx configuration after T331 has expired or stopped.

*END OF CHANGES*

START OF CHANGES

5.7.y MCG failure information

5.7.y.1 General

****

**Figure 5.7.y.1-1: MCG failure information**

The purpose of this procedure is to inform NR 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 fast MCG link recovery procedure in order to continue the RRC connection without re-establishment.

5.7.y.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, fast MCG link recovery is configured (i.e. T316 is configured), and when the following condition is met:

1> upon detecting radio link failure of the MCG, in accordance with 5.3.10.3, while T316 is not running.

Upon initiating the procedure, the UE shall:

1> suspend MCG transmission for all SRBs and DRBs, except SRB0;

1> reset MCG-MAC;

1> initiate transmission of the *MCGFailureInformation* message in accordance with 5.7.y.4.

5.7.y.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*.

#### 5.7.y.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 5.7.y.3;

1> for each *MeasObjectNR* configured by a *measConfig* associated with the MCG, and for which measurement results are available:

2> include an entry in *measResultFreqList*;

2> if there is a *measId* configured with the *MeasObjectNR* and a *reportConfig* which has *rsType* set to *ssb*:

3> set *ssbFrequency* in *measResultFreqList* to the value indicated by *ssbFrequency* as included in the *MeasObjectNR*;

2> if there is a *measId* configured with the *MeasObjectNR* and a *reportConfig* which has *rsType* set to *csi-rs*:

3> set *refFreqCSI-RS* in *measResultFreqList* to the value indicated by *refFreqCSI-RS* as included in the associated measurement object;

2> if a serving cell is associated with the *MeasObjectNR*:

3> set *measResultServingCell* in *measResultFreqList* to include the available quantities of the concerned cell and in accordance with the performance requirements in TS 38.133 [14];

2> set the *measResultNeighCellList* in *measResultFreqList* 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> based on SS/PBCH block if SS/PBCH block measurement results are available and otherwise based on CSI-RS;

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 that are available.1> for each EUTRA frequency the UE is configured to measure by *measConfig* for which measurement results are available:

2> set the *measResultFreqListEUTRA* 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> if the UE is in NR-DC:

2> include and set *measResultSCG* in accordance with 5.7.3.4;

1> if the UE is in NE-DC:

2> include and set *measResultSCG*-*EUTRA* in accordance with TS 36.331 [10] clause 5.6.13.5;

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.

NOTE 2: Field *measResultSCG-Failure* is used to report available results for NR frequencies the UE is configured to measure by SCG RRC signalling.

NOTE 3: Field *measResultSCG-EUTRA* is used to report available results for E-UTRAN frequencies the UE is configured to measure by E-UTRA RRC signalling.

1> if SRB1 is configured as split SRB and *pdcp-Duplication* is not configured:

2> if *primaryPath* refers to the MCG:

3> set *primaryPath* to refer to the SCG.

The UE shall:

1. start timer T316;

1> if SRB1 is configured as split SRB:

2> submit the *MCGFailureInformation* message to lower layers for transmission via SRB1, upon which the procedure ends;

2> else (i.e. SRB3 configured):

3> submit the *MCGFailureInformation* message to lower layers for transmission embedded in NR RRC message *ULInformationTransferMRDC* via SRB3 as specified in 5.7.2a.3.

#### 5.7.y.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

5.7.z UE Information

5.7.z.1 General



Figure 5.7.z.1-1: UE information procedure

The UE information procedure is used by the network to request the UE to report information.

#### 5.7.z.2 Initiation

The network initiates the procedure by sending the *UEInformationRequest* message. The network should initiate this procedure only after successful security activation.

#### 5.7.z.3 Reception of the *UEInformationRequest* message

Upon receiving the *UEInformationRequest* message, the UE shall, only after successful security activation:

Editor’s note: FFS if the *idleModeMeasurementReq* indicates all results (EUTRA and NR), or can request only E-UTRA or NR results. The procedure below assumes the former.

1> if the *idleModeMeasurementReq* is included in the *UEInformationRequest* and the UE has stored *VarMeasIdleReport*:

2> set the *measResultIdleEUTRA* in the *UEInformationResponse* message to the value of *measReportIdle* in the *VarMeasIdleReportEUTRA, if available*;

2> set the *measResultIdleNR* in the *UEInformationResponse* message to the value of *measReportIdleNR* in the *VarMeasIdleReport*, if available;

2> discard the *VarMeasIdleReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

1> submit the *UEInformationResponse* message to lower layers for transmission via SRB1.

*END OF CHANGES*

START OF CHANGES

5.7.2y DL information transfer for MR-DC

5.7.2y.1 General

****

**Figure 5.7.2y.1-1: DL information transfer MR-DC**

The purpose of this procedure is to transfer RRC messages from the network to the UE over SRB3 instead of SRB1 e.g. the NR or E-UTRA RRC connection reconfiguration or RRC connection release message during fast MCG link recovery.

5.7.2y.2 Initiation

The network initiates this procedure whenever there is a need to transfer an RRC message e.g. an RRC connection reconfiguration (involving NR or E-UTRA connection reconfiguration) or an NR or E-UTRA RRC connection release messages during fast MCG link recovery.

5.7.2y.3 Actions related to reception of *DLInformationTransferMRDC* message

Upon receiving the *DLInformationTransferMRDC*, the UE shall:

1> if the *RRCReconfiguration* message is included in *dl-DCCH-MessageNR*:

2> perform the RRC reconfiguration procedure according to 5.3.5.3;

1> else if the *RRCRelease* message is included in *dl-DCCH-MessageNR*:

2> perform the RRC release procedure according to 5.3.8;

1> else if the E-UTRA *RRCConnectionReconfiguration* message is included in *dl-DCCH-MessageEUTRA*:

2> perform the RRC connection reconfiguration procedure as specified in TS 36.331 [10], clause 5.3.5.3;

1> else if the E-UTRA *RRCConnectionRelease* message is included in *dl-DCCH-MessageEUTRA*:

2> perform the RRC connection release as specified in TS 36.331 [10], clause 5.3.8;

*END OF CHANGES*

START OF CHANGES

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

## 6.2 RRC messages

### 6.2.1 General message structure

#### *– DL-DCCH-Message*

The *DL-DCCH-Message* class is the set of RRC messages that may be sent from the network to the UE on the downlink DCCH logical channel.

-- ASN1START

-- TAG-DL-DCCH-MESSAGE-START

DL-DCCH-Message ::= SEQUENCE {

 message DL-DCCH-MessageType

}

DL-DCCH-MessageType ::= CHOICE {

 c1 CHOICE {

 rrcReconfiguration RRCReconfiguration,

 rrcResume RRCResume,

 rrcRelease RRCRelease,

 rrcReestablishment RRCReestablishment,

 securityModeCommand SecurityModeCommand,

 dlInformationTransfer DLInformationTransfer,

 ueCapabilityEnquiry UECapabilityEnquiry,

 counterCheck CounterCheck,

 mobilityFromNRCommand MobilityFromNRCommand,

 ueInformationRequest-r16 UEInformationRequest-r16,

 dlInformationTransferMRDC-r16 DLInformationTransferMRDC-r16,

 spare5 NULL, spare4 NULL,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 messageClassExtension SEQUENCE {}

}

-- TAG-DL-DCCH-MESSAGE-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

#### *– UL-DCCH-Message*

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

-- ASN1START

-- TAG-UL-DCCH-MESSAGE-START

UL-DCCH-Message ::= SEQUENCE {

 message UL-DCCH-MessageType

}

UL-DCCH-MessageType ::= CHOICE {

 c1 CHOICE {

 measurementReport MeasurementReport,

 rrcReconfigurationComplete RRCReconfigurationComplete,

 rrcSetupComplete RRCSetupComplete,

 rrcReestablishmentComplete RRCReestablishmentComplete,

 rrcResumeComplete RRCResumeComplete,

 securityModeComplete SecurityModeComplete,

 securityModeFailure SecurityModeFailure,

 ulInformationTransfer ULInformationTransfer,

 locationMeasurementIndication LocationMeasurementIndication,

 ueCapabilityInformation UECapabilityInformation,

 counterCheckResponse CounterCheckResponse,

 ueAssistanceInformation UEAssistanceInformation,

 failureInformation FailureInformation,

 ulInformationTransferMRDC ULInformationTransferMRDC,

 scgFailureInformation SCGFailureInformation,

 scgFailureInformationEUTRA SCGFailureInformationEUTRA

 },

 messageClassExtension CHOICE {

 c2 CHOICE {

 mcgFailureInformation-r16 MCGFailureInformation-r16,

 ueInformationResponse-r16 UEInformationResponse-r16,

 spare14 NULL, spare13 NULL,

 spare12 NULL, spare11 NULL, spare10 NULL,

 spare9 NULL, spare8 NULL, spare7 NULL,

 spare6 NULL, spare5 NULL, spare4 NULL,

 spare3 NULL, spare2 NULL, spare1 NULL

 }

 },

 messageClassExtensionFuture-r16 SEQUENCE {}

}

-- TAG-UL-DCCH-MESSAGE-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

### 6.2.2 Message definitions

#### *– DLInformationTransferMRDC*

The *DLInformationTransferMRDC* message is used for the downlink transfer of RRC messages (e.g. for transferring NR or E-UTRA RRC connection reconfiguration or RRC connection release message) over SRB3 during fast MCG link recovery via SRB3.

Signalling radio bearer: SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

*DLInformationTransferMRDC message*

-- ASN1START

-- TAG-DLINFORMATIONTRANSFERMRDC-START

DLInformationTransferMRDC-r16 ::= SEQUENCE {

 criticalExtensions CHOICE {

 c1 CHOICE {

 dlInformationTransferMRDC-r16 DLInformationTransferMRDC-r16-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

DLInformationTransferMRDC-r16-IEs::= SEQUENCE {

 dl-DCCH-MessageNR-r16 OCTET STRING OPTIONAL,

 dl-DCCH-MessageEUTRA-r16 OCTET STRING OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-DLINFORMATIONTRANSFERMRDC-STOP

-- ASN1STOP

| *DLInformationTransferMRDC* field descriptions |
| --- |
| ***dl-DCCH-MessageNR***Includes the *DL-DCCH-Message*. In this version of the specification, the field is only used to transfer the NR *RRCReconfiguration* and *RRCRelease* messages. |
| ***dl-DCCH-MessageEUTRA***Includes the *DL-DCCH-Message*. In this version of the specification, the field is only used to transfer the E-UTRA *RRCConnectionReconfiguration* and *RRCConnectionRelease* messages as specified in TS 36.331 [10]. |
|  |

*END OF CHANGES*

START OF CHANGES

#### *– 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

-- TAG-MCGFAILUREINFORMATION-START

MCGFailureInformation-r16 ::= SEQUENCE {

 criticalExtensions CHOICE {

 mcgFailureInformation-r16 MCGFailureInformation-r16-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

MCGFailureInformation-r16-IEs ::= SEQUENCE {

 failureReportMCG-r16 FailureReportMCG-r16 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

FailureReportMCG-r16 ::= SEQUENCE {

 failureType-r16 ENUMERATED {

 t310-Expiry, randomAccessProblem,

 rlc-MaxNumRetx, spare},

 measResultFreqList-r16 MeasResultList2NR OPTIONAL,

 measResultFreqListEUTRA-r16 MeasResultList2EUTRA OPTIONAL,

 measResultSCG-r16 OCTET STRING (CONTAINING MeasResultSCG-Failure) OPTIONAL,

 measResultSCG-EUTRA-r16 OCTET STRING OPTIONAL,

 ...

}

MeasResultList2EUTRA ::= SEQUENCE (SIZE (1..maxNrofServingCellsEUTRA)) OF MeasResult2EUTRA

-- TAG-MCGFAILUREINFORMATION-STOP

-- ASN1STOP

| *MCGFailureInformation field descriptions* |
| --- |
| ***measResultFreqList***The field contains available results of measurements on NR frequencies the UE is configured to measure by the *measConfig* associated with the MCG. |
| ***measResultFreqListEUTRA***The field contains available results of measurements on E-UTRA frequencies the UE is configured to measure by *measConfig* associated with the MCG. |
| ***measResultSCG***The field contains the *MeasResultSCG-Failure* IE which includes available measurement results on NR frequencies the UE is configured to measure by the *measConfig* associated with the SCG. |
| ***measResultSCG-EUTRA***The field contains the EUTRA *MeasResultSCG-FailureMRDC* IE which includes available results of measurements on E-UTRA frequencies the UE is configured to measure by the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. |

*END OF CHANGES*

START OF CHANGES

#### – *RRCRelease*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

*RRCRelease* message

-- ASN1START

-- TAG-RRCRELEASE-START

RRCRelease ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcRelease RRCRelease-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCRelease-IEs ::= SEQUENCE {

 redirectedCarrierInfo RedirectedCarrierInfo OPTIONAL, -- Need N

 cellReselectionPriorities CellReselectionPriorities OPTIONAL, -- Need R

 suspendConfig SuspendConfig OPTIONAL, -- Need R

 deprioritisationReq SEQUENCE {

 deprioritisationType ENUMERATED {frequency, nr},

 deprioritisationTimer ENUMERATED {min5, min10, min15, min30}

 } OPTIONAL, -- Need N

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCRelease-v1540-IEs OPTIONAL

}

RRCRelease-v1540-IEs ::= SEQUENCE {

 waitTime RejectWaitTime OPTIONAL, -- Need N

 nonCriticalExtension RRCRelease-v16xy-IEs OPTIONAL

}

RRCRelease-v16xy-IEs ::= SEQUENCE {

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

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

RedirectedCarrierInfo ::= CHOICE {

 nr CarrierInfoNR,

 eutra RedirectedCarrierInfo-EUTRA,

 ...

}

RedirectedCarrierInfo-EUTRA ::= SEQUENCE {

 eutraFrequency ARFCN-ValueEUTRA,

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

}

CarrierInfoNR ::= SEQUENCE {

 carrierFreq ARFCN-ValueNR,

 ssbSubcarrierSpacing SubcarrierSpacing,

 smtc SSB-MTC OPTIONAL, -- Need S

 ...

}

SuspendConfig ::= SEQUENCE {

 fullI-RNTI I-RNTI-Value,

 shortI-RNTI ShortI-RNTI-Value,

 ran-PagingCycle PagingCycle,

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

 t380 PeriodicRNAU-TimerValue OPTIONAL, -- Need R

 nextHopChainingCount NextHopChainingCount,

 ...

}

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

CellReselectionPriorities ::= SEQUENCE {

 freqPriorityListEUTRA FreqPriorityListEUTRA OPTIONAL, -- Need M

 freqPriorityListNR FreqPriorityListNR OPTIONAL, -- Need M

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

 ...

}

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

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

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

FreqPriorityEUTRA ::= SEQUENCE {

 carrierFreq ARFCN-ValueEUTRA,

 cellReselectionPriority CellReselectionPriority,

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL -- Need R

}

FreqPriorityNR ::= SEQUENCE {

 carrierFreq ARFCN-ValueNR,

 cellReselectionPriority CellReselectionPriority,

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL -- Need R

}

RAN-NotificationAreaInfo ::= CHOICE {

 cellList PLMN-RAN-AreaCellList,

 ran-AreaConfigList PLMN-RAN-AreaConfigList,

 ...

}

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

PLMN-RAN-AreaCell ::= SEQUENCE {

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

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

}

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

PLMN-RAN-AreaConfig ::= SEQUENCE {

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

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

}

RAN-AreaConfig ::= SEQUENCE {

 trackingAreaCode TrackingAreaCode,

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

}

-- TAG-RRCRELEASE-STOP

-- ASN1STOP

|  |
| --- |
| *RRCRelease-IEs* field descriptions |
| ***cnType***Indicate that the UE is redirected to EPC or 5GC. |
| ***deprioritisationReq***Indicates whether the current frequency or RAT is to be de-prioritised. |
| ***deprioritisationTimer***Indicates the period for which either the current carrier frequency or NR is deprioritised. Value *minN* corresponds to N minutes. |
| ***measIdleConfig***Indicates measurement configuration to be stored and used by the UE while in RRC\_IDLE or RRC\_INACTIVE. |
| ***suspendConfig***Indicates configuration for the RRC\_INACTIVE state. The network does not configure *suspendConfig* when the network redirect the UE to an inter-RAT carrier frequency. |
| ***redirectedCarrierInfo***Indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an NR or an inter-RAT carrier frequency, by means of cell selection at transition to RRC\_IDLE or RRC\_INACTIVE as specified in TS 38.304 [20]. In this release of specification, *redirectedCarrierInfo* is not included in an *RRCRelease* message with *suspendConfig* if this message is in response to an *RRCResumeRequest* or an *RRCResumeRequest1* which is triggered by the NAS layer. |

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

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

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

|  |
| --- |
| *PLMN-RAN-AreaCell* field descriptions |
| ***plmn-Identity***PLMN Identity to which the cells in *ran-AreaCells* belong. If the field is absent the UE uses the ID of the registered PLMN. |
| ***ran-AreaCells***The total number of cells of all PLMNs does not exceed 32. |

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

*END OF CHANGES*

START OF CHANGES

#### – *RRCResume*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

*RRCResume* message

-- ASN1START

-- TAG-RRCRESUME-START

RRCResume ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcResume RRCResume-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCResume-IEs ::= SEQUENCE {

 radioBearerConfig RadioBearerConfig OPTIONAL, -- Need M

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

 measConfig MeasConfig OPTIONAL, -- Need M

 fullConfig ENUMERATED {true} OPTIONAL, -- Need N

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCResume-v1560-IEs OPTIONAL

}

RRCResume-v1560-IEs ::= SEQUENCE {

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

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

 nonCriticalExtension RRCResume-v16xy-IEs OPTIONAL

}

RRCResume-v16xy-IEs ::= SEQUENCE {

 idleModeMeasurementReq-r16 ENUMERATED {ffs} OPTIONAL, -- Need N

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

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

 mrdc-SecondaryCellGroup-r16 CHOICE {

 nr-SCG-r16 OCTET STRING (CONTAINING RRCReconfiguration),

 eutra-SCG-r16 OCTET STRING

 } OPTIONAL, -- Need M

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

-- TAG-RRCRESUME-STOP

-- ASN1STOP

|  |
| --- |
| *RRCResume-IEs* field descriptions |
| ***idleModeMeasurementReq*** This field indicates that the UE shall report the idle/inactive measurements to the network in the *RRCResumeComplete* message |
| ***masterCellGroup***Configuration of the master cell group. |
| ***mrdc-SecondaryCellGroup***Includes an RRC message for SCG configuration in NR-DC or NE-DC. For NR-DC (*nr-SCG*), *mrdc-SecondaryCellGroup* contains the *RRCReconfiguration* message as generated (entirely) by SN gNB. In this version of the specification, the RRC message only includes fields *secondaryCellGroup* and *measConfig*. For NE-DC (*eutra-SCG*), *mrdc-SecondaryCellGroup* includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message only include the field *scg-Configuration*. |
| ***radioBearerConfig***Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. |
| ***radioBearerConfig2***Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. This field can only be used if the UE supports NR-DC or NE-DC. |
| ***restoreMCG-SCells***Indicates that the UE shall restore the MCG SCells from the UE Inactive AS Context, if stored. |
| ***restoreSCG***Indicates that the UE shall not release the SCG configurations, if configured. |
| ***sk-Counter***A counter used to derive S-KgNB or S-KeNB based on the newly derived KgNB during RRC Resume. The field is only included when there is one or more RB with *keyToUse* set to *secondary*.  |

*END OF CHANGES*

START OF CHANGES

#### – *RRCResumeComplete*

The *RRCResumeComplete* 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 Network

*RRCResumeComplete* message

-- ASN1START

-- TAG-RRCRESUMECOMPLETE-START

RRCResumeComplete ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcResumeComplete RRCResumeComplete-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCResumeComplete-IEs ::= SEQUENCE {

 dedicatedNAS-Message DedicatedNAS-Message OPTIONAL,

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

 uplinkTxDirectCurrentList UplinkTxDirectCurrentList OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCResumeComplete-v16xy-IEs OPTIONAL

}

RRCResumeComplete-v16xy-IEs ::= SEQUENCE {

 idleMeasAvailable-r16 ENUMERATED {true} OPTIONAL,

 measResultIdleEUTRA-r16 MeasResultIdleEUTRA-r16 OPTIONAL,

 measResultIdleNR-r16 MeasResultIdleNR-r16 OPTIONAL,

 scg-Response CHOICE {

 nr-SCG-Response OCTET STRING (CONTAINING RRCReconfigurationComplete),

 eutra-SCG-Response OCTET STRING

 } OPTIONAL,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

-- TAG-RRCRESUMECOMPLETE-STOP

-- ASN1STOP

|  |
| --- |
| *RRCResumeComplete-IEs* field descriptions |
| ***idleMeasAvailable***Indication that the UE has idle/inactive measurement report available. |
| ***measResultIdleEUTRA***EUTRA measurement results performed during RRC\_INACTIVE. |
| ***measResultIdleNR***NR measurement results performed during RRC\_INACTIVE. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in *SIB1*. |
| ***uplinkTxDirectCurrentList***The Tx Direct Current locations for the configured serving cells and BWPs if requested by the NW (see *reportUplinkTxDirectCurrent* in *CellGroupConfig*). |

*END OF CHANGES*

START OF CHANGES

#### – *RRCSetupComplete*

The *RRCSetupComplete* 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 Network

*RRCSetupComplete* message

-- ASN1START

-- TAG-RRCSETUPCOMPLETE-START

RRCSetupComplete ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcSetupComplete RRCSetupComplete-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCSetupComplete-IEs ::= SEQUENCE {

 selectedPLMN-Identity INTEGER (1..maxPLMN),

 registeredAMF RegisteredAMF OPTIONAL,

 guami-Type ENUMERATED {native, mapped} OPTIONAL,

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

 dedicatedNAS-Message DedicatedNAS-Message,

 ng-5G-S-TMSI-Value CHOICE {

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

 ng-5G-S-TMSI-Part2 BIT STRING (SIZE (9))

 } OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCSetupComplete-v16xy-IEs OPTIONAL

}

RRCSetupComplete-v16xy-IEs ::= SEQUENCE {

 idleMeasAvailable-r16 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

RegisteredAMF ::= SEQUENCE {

 plmn-Identity PLMN-Identity OPTIONAL,

 amf-Identifier AMF-Identifier

}

-- TAG-RRCSETUPCOMPLETE-STOP

-- ASN1STOP

|  |
| --- |
| *RRCSetupComplete-IEs* field descriptions |
| ***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 [23]. |
| ***idleMeasAvailable***Indication that the UE has idle/inactive measurement report available. |
| ***ng-5G-S-TMSI-Part2***The leftmost 9 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 [21]. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in SIB1. |

*END OF CHANGES*

START OF CHANGES

#### – *SystemInformation*

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

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

*SystemInformation message*

-- ASN1START

-- TAG-SYSTEMINFORMATION-START

SystemInformation ::= SEQUENCE {

 criticalExtensions CHOICE {

 systemInformation SystemInformation-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

SystemInformation-IEs ::= SEQUENCE {

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

 sib2 SIB2,

 sib3 SIB3,

 sib4 SIB4,

 sib5 SIB5,

 sib6 SIB6,

 sib7 SIB7,

 sib8 SIB8,

 sib9 SIB9,

 ...,

 sibx SIBx

 },

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-SYSTEMINFORMATION-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

#### – *SIB1*

*SIB1* contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information.It also contains radio resource configuration information that is common for all UEs and barring information applied to the unified access control.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

*SIB1* message

-- ASN1START

-- TAG-SIB1-START

SIB1 ::= SEQUENCE {

 cellSelectionInfo SEQUENCE {

 q-RxLevMin Q-RxLevMin,

 q-RxLevMinOffset INTEGER (1..8) OPTIONAL, -- Need S

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

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

 q-QualMinOffset INTEGER (1..8) OPTIONAL -- Need S

 } OPTIONAL, -- Cond Standalone

 cellAccessRelatedInfo CellAccessRelatedInfo,

 connEstFailureControl ConnEstFailureControl OPTIONAL, -- Need R

 si-SchedulingInfo SI-SchedulingInfo OPTIONAL, -- Need R

 servingCellConfigCommon ServingCellConfigCommonSIB OPTIONAL, -- Need R

 ims-EmergencySupport ENUMERATED {true} OPTIONAL, -- Need R

 eCallOverIMS-Support ENUMERATED {true} OPTIONAL, -- Cond Absent

 ue-TimersAndConstants UE-TimersAndConstants OPTIONAL, -- Need R

 uac-BarringInfo SEQUENCE {

 uac-BarringForCommon UAC-BarringPerCatList OPTIONAL, -- Need S

 uac-BarringPerPLMN-List UAC-BarringPerPLMN-List OPTIONAL, -- Need S

 uac-BarringInfoSetList UAC-BarringInfoSetList,

 uac-AccessCategory1-SelectionAssistanceInfo CHOICE {

 plmnCommon UAC-AccessCategory1-SelectionAssistanceInfo,

 individualPLMNList SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AccessCategory1-SelectionAssistanceInfo

 } OPTIONAL -- Need S

 } OPTIONAL, -- Need R

 useFullResumeID ENUMERATED {true} OPTIONAL, -- Need R

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SIB1-v16xy-IEs OPTIONAL

}

SIB1-v16xy-IEs ::= SEQUENCE {

 idleModeMeasurements-r16 ENUMERATED{ffs} OPTIONAL, -- Need N

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

UAC-AccessCategory1-SelectionAssistanceInfo ::= ENUMERATED {a, b, c}

-- TAG-SIB1-STOP

-- ASN1STOP

|  |
| --- |
| *SIB1* field descriptions |
| ***cellSelectionInfo***Parameters for cell selection related to the serving cell. |
| ***idleModeMeasurements***This field indicates that the UE can include idle/inactive measurement report availability during connection establishment or resumption. |
| ***ims-EmergencySupport***Indicates whether the cell supports IMS emergency bearer services for UEs in limited service mode. If absent, IMS emergency call is not supported by the network in the cell for UEs in limited service mode. |
| ***q-QualMin***Parameter "Qqualmin" in TS 38.304 [20], applicable for serving cell. If the field is absent, the UE applies the (default) value of negative infinity for Qqualmin.  |
| ***q-QualMinOffset***Parameter "Qqualminoffset" in TS 38.304 [20]. Actual value Qqualminoffset = field value [dB]. If the field is absent, the UE applies the (default) value of 0 dB for Qqualminoffset.Affects the minimum required quality level in the cell. |
| ***q-RxLevMin***Parameter "Qrxlevmin" in TS 38.304 [20], applicable for serving cell. |
| ***q-RxLevMinOffset***Parameter "Qrxlevminoffset" in TS 38.304 [20]. Actual value Qrxlevminoffset = field value \* 2 [dB]. If absent, the UE applies the (default) value of 0 dB for Qrxlevminoffset*.* Affects the minimum required Rx level in the cell. |
| ***q-RxLevMinSUL***Parameter "Qrxlevmin" in TS 38.304 [20], applicable for serving cell. |
| ***servingCellConfigCommon***Configuration of the serving cell. |
| ***uac-AccessCategory1-SelectionAssistanceInfo***Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. |
| ***uac-BarringForCommon***Common access control parameters for each access category. Common values are used for all PLMNs, unless overwritten by the PLMN specific configuration provided in *uac-BarringPerPLMN-List*. The parameters are specified by providing an index to the set of configurations (*uac-BarringInfoSetList*). UE behaviour upon absence of this field is specified in clause 5.3.14.2. |
| ***ue-TimersAndConstants***Timer and constant values to be used by the UE. The cell operating as PCell always provides this field. |
| ***useFullResumeID***Indicates which resume identifier and Resume request message should be used. UE uses *fullI-RNTI* and *RRCResumeRequest1* if the field is present, or *shortI-RNTI* and *RRCResumeRequest* if the field is absent. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *Absent* | The field is not used in this version of the specification, if received the UE shall ignore. |
| *Standalone* | The field is mandatory present in a cell that supports standalone operation, otherwise it is absent. |

*END OF CHANGES*

START OF CHANGES

#### – *UEInformationRequest*

The *UEInformationRequest* message is used by the network to retrieve information from the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

*UEInformationRequest message*

-- ASN1START

-- TAG-UEINFORMATIONREQUEST-START

UEInformationRequest-r16 ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 ueInformationRequest-r16 UEInformationRequest-r16-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

UEInformationRequest-r16-IEs ::= SEQUENCE {

 idleModeMeasurementReq-r16 ENUMERATED{ffs} OPTIONAL, -- Need N

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-UEINFORMATIONREQUEST-STOP

-- ASN1STOP

|  |
| --- |
| *UEInformationRequest-IEs* field descriptions |
| ***idleModeMeasurementReq*** This field indicates that the UE shall report the idle/inactive measurement information, if available, to the network in the *UEInformationResponse* message  |

*END OF CHANGES*

START OF CHANGES

#### – *UEInformationResponse*

The *UEInformationResponse* message is used by the UE to transfer information requested by the network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

*UEInformationResponse message*

-- ASN1START

-- TAG-UEINFORMATIONRESPONSE-START

UEInformationResponse-r16 ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 ueInformationResponse-r16 UEInformationResponse-r16-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

UEInformationResponse-r16-IEs ::= SEQUENCE {

 measResultIdleEUTRA-r16 MeasResultIdleEUTRA-r16 OPTIONAL,

 measResultIdleNR-r16 MeasResultIdleNR-r16 OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-UEINFORMATIONRESPONSE-STOP

-- ASN1STOP

|  |
| --- |
| *UEInformationResponse-IEs* field descriptions |
| ***measResultIdleEUTRA***EUTRA measurement results performed during RRC\_INACTIVE or RRC\_IDLE. |
| ***measResultIdleNR***NR measurement results performed during RRC\_INACTIVE or RRC\_IDLE. |

*END OF CHANGES*

START OF CHANGES

#### *– ULInformationTransferMRDC*

The *ULInformationTransferMRDC* message is used for the uplink transfer of MR-DC dedicated information (e.g. for transferring the NR or E-UTRA RRC *MeasurementReport* message, the *FailureInformation* message, or the *MCGFailureInformation* message).

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

*ULInformationTransferMRDC message*

-- ASN1START

-- TAG-ULINFORMATIONTRANSFERMRDC-START

ULInformationTransferMRDC ::= SEQUENCE {

 criticalExtensions CHOICE {

 c1 CHOICE {

 ulInformationTransferMRDC ULInformationTransferMRDC-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

ULInformationTransferMRDC-IEs::= SEQUENCE {

 ul-DCCH-MessageNR OCTET STRING OPTIONAL,

 ul-DCCH-MessageEUTRA OCTET STRING OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-ULINFORMATIONTRANSFERMRDC-STOP

-- ASN1STOP

| *ULInformationTransferMRDC* field descriptions |
| --- |
| ***ul-DCCH-MessageNR***Includes the *UL-DCCH-Message*. In this version of the specification, the field is only used to transfer the NR RRC *MeasurementReport* and *FailureInformation* messages when sent via SRB1 and to transfer the NR *MCGFailureInformation* message when sent via SRB3. |
| ***ul-DCCH-MessageEUTRA***Includes the *UL-DCCH-Message*. In this version of the specification, the field is only used to transfer the E-UTRA RRC *MeasurementReport* message when sent via SRB1 and to transfer the E-UTRA *MCGFailureInformation* message when sent via SRB3. |

*END OF CHANGES*

START OF CHANGES

## 6.3 RRC information elements

### 6.3.1 System information blocks

– *SIBx*

*SIBx* contains information related to idle/inactive measurements.

***SIBx* information element**

-- ASN1START

-- TAG-SIBx-START

SIBx ::= SEQUENCE {

 measIdleConfigSIB-r16 MeasIdleConfigSIB-r16 OPTIONAL, -- Need S

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...

}

-- TAG-SIBx-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

### 6.3.2 Radio resource control information elements

#### – *CellGroupConfig*

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

*CellGroupConfig* information element

-- ASN1START

-- TAG-CELLGROUPCONFIG-START

-- Configuration of one Cell-Group:

CellGroupConfig ::= SEQUENCE {

 cellGroupId CellGroupId,

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

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

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

 physicalCellGroupConfig PhysicalCellGroupConfig OPTIONAL, -- Need M

 spCellConfig SpCellConfig OPTIONAL, -- Need M

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

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

 ...,

 [[

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

 ]],

 [[

 dormancySCellGroups DormancySCellGroups OPTIONAL -- Need N

 ]]

}

DormancySCellGroups::= SEQUENCE {

 withinActiveTimeToAddModList SEQUENCE (SIZE (1..maxNrofDormancyGroups)) OF DormancyGroup-r16 OPTIONAL, -- Need N

 withinActiveTimeToReleaseList SEQUENCE (SIZE (1..maxNrofDormancyGroups)) OF DormancyGroupID-r16 OPTIONAL, -- Need N

 outsideActiveTimeToAddModList SEQUENCE (SIZE (1..maxNrofDormancyGroups)) OF DormancyGroup-r16 OPTIONAL, -- Cond DormancyWUS

 outsideActiveTimeToReleaseList SEQUENCE (SIZE (1..maxNrofDormancyGroups)) OF DormancyGroupID-r16 OPTIONAL -- Need N

}

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

SpCellConfig ::= SEQUENCE {

 servCellIndex ServCellIndex OPTIONAL, -- Cond SCG

 reconfigurationWithSync ReconfigurationWithSync OPTIONAL, -- Cond ReconfWithSync

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

 rlmInSyncOutOfSyncThreshold ENUMERATED {n1} OPTIONAL, -- Need S

 spCellConfigDedicated ServingCellConfig OPTIONAL, -- Need M

 ...

}

ReconfigurationWithSync ::= SEQUENCE {

 spCellConfigCommon ServingCellConfigCommon OPTIONAL, -- Need M

 newUE-Identity RNTI-Value,

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

 rach-ConfigDedicated CHOICE {

 uplink RACH-ConfigDedicated,

 supplementaryUplink RACH-ConfigDedicated

 } OPTIONAL, -- Need N

 ...,

 [[

 smtc SSB-MTC OPTIONAL -- Need S

 ]]

}

SCellConfig ::= SEQUENCE {

 sCellIndex SCellIndex,

 sCellConfigCommon ServingCellConfigCommon OPTIONAL, -- Cond SCellAdd

 sCellConfigDedicated ServingCellConfig OPTIONAL, -- Cond SCellAddMod

 ...,

 [[

 smtc SSB-MTC OPTIONAL -- Need S

 ]],

 [[

 sCellState-r16 ENUMERATED {activated} OPTIONAL -- Need S

 ]]

}

DormancyGroup-r16 ::= SEQUENCE {

 dormancyGroupID-r16 DormancyGroupID-r16,

 dormancySCellList-r16 SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellIndex

}

DormancyGroupID-r16 ::= INTEGER (0..4)

-- TAG-CELLGROUPCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *CellGroupConfig* field descriptions |
| ***mac-CellGroupConfig***MAC parameters applicable for the entire cell group. |
| ***rlc-BearerToAddModList***Configuration of the MAC Logical Channel, the corresponding RLC entities and association with radio bearers. |
| ***reportUplinkTxDirectCurrent***Enables reporting of uplink and supplementary uplink Direct Current location information upon BWP configuration and reconfiguration. This field is only present when the BWP configuration is modified or any serving cell is added or removed. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. If UE is configured with SUL carrier, UE reports both UL and SUL Direct Current locations. |
| ***rlmInSyncOutOfSyncThreshold***BLER threshold pair index for IS/OOS indication generation, see TS 38.133 [14], table 8.1.1-1. *n1* corresponds to the value 1. When the field is absent, the UE applies the value 0. Whenever this is reconfigured, UE resets N310 and N311, and stops T310, if running. Network does not include this field. |
| ***sCellState***Indicates whether the SCell shall be considered to be in activated state upon SCell configuration. |
| ***sCellToAddModList***List of seconary serving cells (SCells) to be added or modified. |
| ***sCellToReleaseList***List of secondary serving cells (SCells) to be released. |
| ***spCellConfig***Parameters for the SpCell of this cell group (PCell of MCG or PSCell of SCG).  |

| *DormancyGroup* field descriptions |
| --- |
| ***dormancySCellList***List of SCells within the same SCell dormancy group. |
| ***dormancyGroupID***The field indicates an SCell group corresponding to the explicit information field in DCI, i.e., bitmap with 1 bit per *DormancyGroup* for indicating dormancy/non-dormancy of SCells, as specified in TS 38.213.  |

|  |
| --- |
| *DormancySCellGroups* field descriptions |
| ***outsideActiveTimeToAddModList***List of Dormancy outside active time SCell groups to be added or modified. The use of the Dormancy outside active time SCell groups is specified in TS 38.213 [13]. |
| ***withinActiveTimeToAddModList***List of Dormancy within active time SCell groups SCell groups to be added or modified. The use of the Dormancy within active time SCell groups is specified in TS 38.213 [13].  |

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

|  |
| --- |
| *SCellConfig* field descriptions |
| ***smtc***The SSB periodicity/offset/duration configuration of target cell for NR SCell addition. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *sCellConfigCommon*. The *smtc* is based on the timing of the SpCell of associated cell group. In case of inter-RAT handover to NR, the timing reference is the NR PCell. In case of intra-NR PCell change (standalone NR) or NR PSCell change (EN-DC), the timing reference is the target SpCell. If the field is absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. |

|  |
| --- |
| *SpCellConfig* field descriptions |
| ***reconfigurationWithSync***Parameters for the synchronous reconfiguration to the target SpCell. |
| ***rlf-TimersAndConstants***Timers and constants for detecting and triggering cell-level radio link failure. For the SCG, *rlf-TimersAndConstants* can only be set to *setup* and is always included at SCG addition. |
| ***servCellIndex***Serving cell ID of a PSCell. The PCell of the Master Cell Group uses ID = 0. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *BWP-Reconfig* | The field is optionally present, Need N, if the BWPs are reconfigured or if serving cells are added or removed. Otherwise it is absent.  |
| *DormancyWUS* | The field is optionally present, Need N, if WUS is configured*;* otherwise it is absent. |
| *ReconfWithSync* | The field is mandatory present in case of SpCell change, PSCell addition, update of required SI for PSCell and AS security key change; otherwise it is optionally present, need M. The field is absent in the *masterCellGroup* in *RRCResume* or *RRCSetup* messages. |
| *SCellAdd* | The field is mandatory present upon SCell addition; otherwise it is absent, Need M. |
| *SCellAddMod* | The field is mandatory present upon SCell addition; otherwise it is optionally present, need M. |
| *SCG* | The field is mandatory present in an *SpCellConfig* for the PSCell. It is absent otherwise.  |

*END OF CHANGES*

START OF CHANGES

#### – *CrossCarrierSchedulingConfig*

The IE *CrossCarrierSchedulingConfig* is used to specify the configuration when the cross-carrier scheduling is used in a cell.

*CrossCarrierSchedulingConfig* information element

-- ASN1START

-- TAG-CrossCarrierSchedulingConfig-START

CrossCarrierSchedulingConfig ::= SEQUENCE {

 schedulingCellInfo CHOICE {

 own SEQUENCE { -- Cross carrier scheduling: scheduling cell

 cif-Presence BOOLEAN

 },

 other SEQUENCE { -- Cross carrier scheduling: scheduled cell

 schedulingCellId ServCellIndex,

 cif-InSchedulingCell INTEGER (1..7)

 }

 },

 ...

}

-- TAG-CrossCarrierSchedulingConfig-STOP

-- ASN1STOP

| *CrossCarrierSchedulingConfig* field descriptions |
| --- |
| ***cif-Presence***The field is used to indicate whether carrier indicator field is present (value *true*) or not (value *false*) in PDCCH DCI formats, see TS 38.213 [13]. If *cif-Presence* is set to *true*, the CIF value indicating a grant or assignment for this cell is 0. |
| ***cif-InSchedulingCell***The field indicates the CIF value used in the scheduling cell to indicate a grant or assignment applicable for this cell, see TS 38.213 [13]. |
| ***other***Parameters for cross-carrier scheduling, i.e., a serving cell is scheduled by a PDCCH on another (scheduling) cell. The network configures this field only for SCells. When SCS of scheduling PDCCH is different from SCS of scheduled PDSCH, the time gap delta-values between the end of the PDCCH and start of the PDSCH is required to be not smaller than the minimal values specified in TS 38.214 [19]. |
| ***own***Parameters for self-scheduling, i.e., a serving cell is scheduled by its own PDCCH. |
| ***schedulingCellId***Indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. |

*END OF CHANGES*

START OF CHANGES

– *MeasIdleConfig*

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

***MeasIdleConfig* information element**

-- ASN1START

-- TAG-MEASIDLECONFIG-START

MeasIdleConfigSIB-r16 ::= SEQUENCE {

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

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

 ...

}

MeasIdleConfigDedicated-r16 ::= SEQUENCE {

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

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

 measIdleDuration-r16 ENUMERATED{ffs},

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

 ...

}

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

ValidityArea-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR,

 validityCellList-r16 ValidityCellList OPTIONAL -- Need N

}

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

MeasIdleCarrierNR-r16 ::= SEQUENCE {

 carrierFreqNR-r16 ARFCN-ValueNR,

 measCellListNR-r16 CellListNR-r16 OPTIONAL, -- Need FFS

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

 qualityThreshold-r16 SEQUENCE {

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

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

 } OPTIONAL, -- Need N

 ssb-MeasConfig-r16 SEQUENCE {

 frequencyBandList                   MultiFrequencyBandListNR OPTIONAL,

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

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

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

 ssbSubcarrierSpacing-r16 SubcarrierSpacing,

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

 deriveSSB-IndexFromCell-r16 BOOLEAN,

 ss-RSSI-Measurement-r16 SS-RSSI-Measurement OPTIONAL

-- Editors note: FFS if frequencyBandList and ssbSubcarrierSpacing should be defined together with the carrierFreqNR (i.e. outside the ssb-MeasConfig structure)

 } OPTIONAL, -- Cond FFS

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

 ...

}

MeasIdleCarrierEUTRA-r16 ::= SEQUENCE {

 carrierFreqEUTRA-r16 ARFCN-ValueEUTRA,

 allowedMeasBandwidth-r16 EUTRA-AllowedMeasBandwidth,

 measCellListEUTRA-r16 CellListEUTRA-r16 OPTIONAL, -- Need FFS

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

 qualityThreshold-r16 SEQUENCE {

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

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

 } OPTIONAL, -- Need FFS

 ...

}

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

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

BeamMeasConfigIdle-NR-r16 ::= SEQUENCE {

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

 maxNrofRS-IndexesToReport-r16 INTEGER (1..maxNrofFFS) OPTIONAL, -- Need FFS

 includeBeamMeasurements-r16 BOOLEAN

}

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

-- TAG-MEASIDLECONFIG-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

– *MeasResultIdleEUTRA*

The IE *MeasResultIdleEUTRA* covers the E-UTRA measurement results performed in RRC\_IDLE and RRC\_INACTIVE.

***MeasResultIdleEUTRA* information element**

-- ASN1START

-- TAG-MEASRESULTIDLEEUTRA-START

MeasResultIdleEUTRA-r16 ::= SEQUENCE {

 measResultsPerCarrierListIdleEUTRA-r16 SEQUENCE (SIZE (1..maxNrofFFS)) OF MeasResultsPerCarrierIdleEUTRA-r16,

 ...

}

MeasResultsPerCarrierIdleEUTRA-r16 ::= SEQUENCE {

 carrierFreqEUTRA-r16 ARFCN-ValueEUTRA,

 measResultsPerCellListIdleEUTRA-r16 SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleEUTRA-r16,

 ...

}

MeasResultsPerCellIdleEUTRA-r16 ::= SEQUENCE {

 eutra-PhysCellId-r16 EUTRA-PhysCellId,

 measResultEUTRA-r16 SEQUENCE {

 rsrp-Result-r16 RSRP-RangeEUTRA OPTIONAL,

 rsrq-Result-r16 RSRQ-RangeEUTRA-r16 OPTIONAL

 },

 ...

}

-- TAG-MEASRESULTIDLEEUTRA-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

– *MeasResultIdleNR*

The IE *MeasResultIdleNR* covers the NR measurement results performed in RRC\_IDLE and RRC\_INACTIVE.

***MeasResultIdleNR* information element**

-- ASN1START

-- TAG-MEASRESULTIDLENR-START

MeasResultIdleNR-r16 ::= SEQUENCE {

 measResultServingCell-r16 SEQUENCE {

 rsrp-Result-r16 RSRP-Range,

 rsrq-Result-r16 RSRQ-Range,

 resultsSSB-Indexes-r16 ResultsPerSSB-IndexList-r16 OPTIONAL

 },

 measResultsPerCarrierListIdleNR-r16 SEQUENCE (SIZE (1..maxNrofFFS)) OF MeasResultsPerCarrierIdleNR-r16 OPTIONAL,

 ...

}

MeasResultsPerCarrierIdleNR-r16 ::= SEQUENCE {

 carrierFreqNR-r16 ARFCN-ValueNR,

 measResultsPerCellListIdleNR-r16 SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleNR-r16,

 ...

}

MeasResultsPerCellIdleNR-r16 ::= SEQUENCE {

 physCellId-r16 PhysCellId,

 measResultNR-r16 SEQUENCE {

 rsrp-Result-r16 RSRP-Range OPTIONAL,

 rsrq-Result-r16 RSRQ-Range OPTIONAL,

 resultsSSB-Indexes-r16 ResultsPerSSB-IndexList-r16 OPTIONAL

 },

 ...

}

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

ResultsPerSSB-IndexIdle-r16 ::= SEQUENCE {

 ssb-Index-r16 SSB-Index,

 ssb-Results-r16 SEQUENCE {

 ssb-RSRP-Result-r16 RSRP-Range OPTIONAL,

 ssb-RSRQ-Result-r16 RSRQ-Range OPTIONAL

 } OPTIONAL

}

-- TAG-MEASRESULTIDLENR-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

#### – *NZP-CSI-RS-ResourceSet*

The IE *NZP-CSI-RS-ResourceSet* is a set of Non-Zero-Power (NZP) CSI-RS resources (their IDs) and set-specific parameters.

*NZP-CSI-RS-ResourceSet* information element

-- ASN1START

-- TAG-NZP-CSI-RS-RESOURCESET-START

NZP-CSI-RS-ResourceSet ::= SEQUENCE {

 nzp-CSI-ResourceSetId NZP-CSI-RS-ResourceSetId,

 nzp-CSI-RS-Resources SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerSet)) OF NZP-CSI-RS-ResourceId,

 repetition ENUMERATED { on, off } OPTIONAL, -- Need S

 aperiodicTriggeringOffset INTEGER(0..6) OPTIONAL, -- Need S

 trs-Info ENUMERATED {true} OPTIONAL, -- Need R

 ...

}

-- TAG-NZP-CSI-RS-RESOURCESET-STOP

-- ASN1STOP

|  |
| --- |
| *NZP-CSI-RS-ResourceSet* field descriptions |
| ***aperiodicTriggeringOffset, aperiodicTriggeringOffsetExt***Offset X between the slot containing the DCI that triggers a set of aperiodic NZP CSI-RS resources and the slot in which the CSI-RS resource set is transmitted. For *aperiodicTriggeringOffset*, the value 0 corresponds to 0 slots, value 1 corresponds to 1 slot, value 2 corresponds to 2 slots, value 3 corresponds to 3 slots, value 4 corresponds to 4 slots, value 5 corresponds to 16 slots, value 6 corresponds to 24 slots. For *aperiodicTriggeringOffsetExt*, the value indicates the number of slots. The network configures only one of the fields.When neither field is included, the UE applies the value 0. |
| ***nzp-CSI-RS-Resources***NZP-CSI-RS-Resources associated with this NZP-CSI-RS resource set (see TS 38.214 [19], clause 5.2). For CSI, there are at most 8 NZP CSI RS resources per resource set. |
| ***repetition***Indicates whether repetition is on/off. If the field is set to *off* or if the field is absent, the UE may not assume that the NZP-CSI-RS resources within the resource set are transmitted with the same downlink spatial domain transmission filter and with same NrofPorts in every symbol (see TS 38.214 [19], clauses 5.2.2.3.1 and 5.1.6.1.2). Can only be configured for CSI-RS resource sets which are associated with *CSI-ReportConfig* with report of L1 RSRP or "no report". |
| ***trs-Info***Indicates that the antenna port for all NZP-CSI-RS resources in the CSI-RS resource set is same. If the field is absent or released the UE applies the value *false* (see TS 38.214 [19], clause 5.2.2.3.1). |

*END OF CHANGES*

START OF CHANGES

#### – *PhysicalCellGroupConfig*

The IE *PhysicalCellGroupConfig* is used to configure cell-group specific L1 parameters.

*PhysicalCellGroupConfig* information element

-- ASN1START

-- TAG-PHYSICALCELLGROUPCONFIG-START

PhysicalCellGroupConfig ::= SEQUENCE {

 harq-ACK-SpatialBundlingPUCCH ENUMERATED {true} OPTIONAL, -- Need S

 harq-ACK-SpatialBundlingPUSCH ENUMERATED {true} OPTIONAL, -- Need S

 p-NR-FR1 P-Max OPTIONAL, -- Need R

 pdsch-HARQ-ACK-Codebook ENUMERATED {semiStatic, dynamic},

 tpc-SRS-RNTI RNTI-Value OPTIONAL, -- Need R

 tpc-PUCCH-RNTI RNTI-Value OPTIONAL, -- Need R

 tpc-PUSCH-RNTI RNTI-Value OPTIONAL, -- Need R

 sp-CSI-RNTI RNTI-Value OPTIONAL, -- Need R

 cs-RNTI SetupRelease { RNTI-Value } OPTIONAL, -- Need M

 ...,

 [[

 mcs-C-RNTI RNTI-Value OPTIONAL, -- Need R

 p-UE-FR1 P-Max OPTIONAL -- Cond MCG-Only

 ]],

 [[

 xScale ENUMERATED {dB0, dB6, spare2, spare1} OPTIONAL -- Cond SCG-Only

 ]],

 [[

 pdcch-BlindDetection SetupRelease { PDCCH-BlindDetection } OPTIONAL -- Need M

 ]],

[[

 harq-ACK-SpatialBundlingPUCCH-secondaryPUCCH-group-r16 ENUMERATED {true} OPTIONAL, -- Cond twoPUCCHgroup

 harq-ACK-SpatialBundlingPUSCH-secondaryPUCCH-group-r16 ENUMERATED {true} OPTIONAL, -- Cond twoPUCCHgroup

 pdsch-HARQ-ACK-Codebook-secondaryPUCCH-group-r16 ENUMERATED {semiStatic, dynamic} OPTIONAL, -- Cond twoPUCCHgroup

 p-NR-FR2-r16 P-Max OPTIONAL, -- Need R

 p-UE-FR2-r16 P-Max OPTIONAL, -- Cond MCG-Only

 nrdc-PCmode-FR1-r16 ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic} OPTIONAL, -- Cond MCG-Only

 nrdc-PCmode-FR2-r16 ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic} OPTIONAL -- Cond MCG-Only

 ]]

}

PDCCH-BlindDetection ::= INTEGER (1..15)

-- TAG-PHYSICALCELLGROUPCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *PhysicalCellGroupConfig* field descriptions |
| ***cs-RNTI***RNTI value for downlink SPS (see *SPS-Config*) and uplink configured grant (see *ConfiguredGrantConfig*). |
| ***harq-ACK-SpatialBundlingPUCCH***Enables spatial bundling of HARQ ACKs. It is configured per cell group (i.e. for all the cells within the cell group) for PUCCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule. When the field is absent, the spatial bundling is disabled (see TS 38.213 [13], clause 9.1.2.1). If the field *harq-ACK SpatialBundlingPUCCH-secondaryPUCCHgroup* is present, *harq-ACK-SpatialBundlingPUCCH* is only applied to primary PUCCH group. |
| ***harq-ACK-SpatialBundlingPUCCH-secondaryPUCCHgroup***Enables spatial bundling of HARQ ACKs. It is configured for secondary PUCCH group for PUCCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule (see TS 38.213 [13], clause 9.1.2.1). |
| ***harq-ACK-SpatialBundlingPUSCH***Enables spatial bundling of HARQ ACKs. It is configured per cell group (i.e. for all the cells within the cell group) for PUSCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule. When the field is absent, the spatial bundling is disabled (see TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2). If the field *harq-ACK SpatialBundlingPUSCH-secondaryPUCCHgroup* is present, *harq-ACK-SpatialBundlingPUSCH* is only applied to primary PUCCH group. |
| ***harq-ACK-SpatialBundlingPUSCH-secondaryPUSCHgroup***Enables spatial bundling of HARQ ACKs. It is configured for secondary PUCCH group for PUSCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule (see TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2). |
| ***mcs-C-RNTI***RNTI to indicate use of *qam64LowSE* for grant-based transmissions. When the *mcs*-*C-RNT*I is configured, RNTI scrambling of DCI CRC is used to choose the corresponding MCS table. |
| ***nrdc-PCmode-FR1***Indicates the uplink power sharing mode that the UE uses in NR-DC in frequency range 1 (FR1) (see TS 38.213 [13], clause 7.6). |
| ***nrdc-PCmode-FR2***Indicates the uplink power sharing mode that the UE uses in NR-DC in frequency range 2 (FR2) (see TS 38.213 [13], clause 7.6). |
| ***pdcch-BlindDetection***Indicates the reference number of cells for PDCCH blind detection for the CG. Network configures the field for each CG when the UE is in NR DC and sets the value in accordance with the constraints specified in TS 38.213 [13]. The network configures *pdcch-BlindDetection* only if the UE is in NR-DC. |
| ***p-NR-FR1***The maximum total transmit power to be used by the UE in this NR cell group across all serving cells in frequency range 1 (FR1). The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-UE-FR1* (configured total for all serving cells operating on FR1). |
| ***p-NR-FR2***The maximum total transmit power to be used by the UE in this NR cell group across all serving cells in frequency range 2 (FR2). The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-UE-FR2* (configured total for all serving cells operating on FR2). |
| ***p-UE-FR1***The maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1) across all cell groups. The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-NR-FR1* (configured for the cell group). |
| ***p-UE-FR2***The maximum total transmit power to be used by the UE across all serving cells in frequency range 2 (FR2) across all cell groups. The maximum transmit power that the UE may use may be additionally limited by p-Max (configured in FrequencyInfoUL) and by p-NR-FR2 (configured for the cell group). |
| ***pdsch-HARQ-ACK-Codebook***The PDSCH HARQ-ACK codebook is either semi-static or dynamic. This is applicable to both CA and none CA operation (see TS 38.213 [13], clauses 9.1.2 and 9.1.3). If the field *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup* is present, *pdsch-HARQ-ACK-Codebook* is applied to primary PUCCH group. Otherwise, this field is applied to the cell group (i.e. for all the cells within the cell group). |
| ***pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup***The PDSCH HARQ-ACK codebook is either semi-static or dynamic. This is applicable to both CA and none CA operation (see TS 38.213 [13], clauses 9.1.2 and 9.1.3). It is configured for secondary PUCCH group*.* |
| ***sp-CSI-RNTI***RNTI for Semi-Persistent CSI reporting on PUSCH (see *CSI-ReportConfig*) (see TS 38.214 [19], clause 5.2.1.5.2). Network always configures the UE with a value for this field when at least one *CSI-ReportConfig* with *reportConfigType* set to *semiPersistentOnPUSCH* is configured. |
| ***tpc-PUCCH-RNTI***RNTI used for PUCCH TPC commands on DCI (see TS 38.213 [13], clause 10.1). |
| ***tpc-PUSCH-RNTI***RNTI used for PUSCH TPC commands on DCI (see TS 38.213 [13], clause 10.1). |
| ***tpc-SRS-RNTI***RNTI used for SRS TPC commands on DCI (see TS 38.213 [13], clause 10.1). |
| ***xScale***The UE is allowed to drop NR only if the power scaling applied to NR results in a difference between scaled and unscaled NR UL of more than *xScale* dB (see TS 38.213 [13]). If the value is not configured for dynamic power sharing, the UE assumes default value of 6 dB. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *MCG-Only* | This field is optionally present, Need R, in the *PhysicalCellGroupConfig* of the MCG. It is absent otherwise.  |
| *SCG-Only* | This field is optionally present, Need S, in the *PhysicalCellGroupConfig* of the SCG in (NG)EN-DC as defined in TS 38.213 [13]. It is absent otherwise. |
| *twoPUCCHgroup* | This field is optionally present, Need R, if secondary PUCCH group is configured. It is absent otherwise.  |

*END OF CHANGES*

START OF CHANGES

#### – *RLF-TimersAndConstants*

The IE *RLF-TimersAndConstants* is used to configure UE specific timers and constants.

*RLF-TimersAndConstants* information element

-- ASN1START

-- TAG-RLF-TIMERSANDCONSTANTS-START

RLF-TimersAndConstants ::= SEQUENCE {

 t310 ENUMERATED {ms0, ms50, ms100, ms200, ms500, ms1000, ms2000, ms4000, ms6000},

 n310 ENUMERATED {n1, n2, n3, n4, n6, n8, n10, n20},

 n311 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10},

 ...,

 [[

 t311 ENUMERATED {ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000}

 ]],

 [[

 t316-r16 SetupRelease {T316-r16 } OPTIONAL -- Cond MCG-Only

 ]]

}

T316-r16 ::= ENUMERATED {ffs}

-- TAG-RLF-TIMERSANDCONSTANTS-STOP

-- ASN1STOP

| *RLF-TimersAndConstants* field descriptions |
| --- |
| ***n3xy***Constants are described in clause 7.3. Value *n1* corresponds to 1, value *n2* corresponds to 2 and so on. |
| ***t3xy***Timers are described in clause 7.1. Value *ms0* corresponds to 0 ms, value *ms50* corresponds to 50 ms and so on. Configuration of t316 for the MCG indicates that fast MCG link recovery is configured. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *MCG-Only* | This field is optionally present, Need N, in the *RLF-TimersAndConstants* of the MCG, if the UE is configured with split SRB1 or SRB3. It is absent otherwise.  |

*END OF CHANGES*

START OF CHANGES

#### – *ServingCellConfig*

The IE *ServingCellConfig* is used to configure (add or modify) the UE with a serving cell, which may be the SpCell or an SCell of an MCG or SCG. The parameters herein are mostly UE specific but partly also cell specific (e.g. in additionally configured bandwidth parts). Reconfiguration between a PUCCH and PUCCHless SCell is only supported using an SCell release and add.

*ServingCellConfig* information element

-- ASN1START

-- TAG-SERVINGCELLCONFIG-START

ServingCellConfig ::= SEQUENCE {

 tdd-UL-DL-ConfigurationDedicated TDD-UL-DL-ConfigDedicated OPTIONAL, -- Cond TDD

 initialDownlinkBWP BWP-DownlinkDedicated OPTIONAL, -- Need M

 downlinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

 downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink OPTIONAL, -- Need N

 firstActiveDownlinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

 bwp-InactivityTimer ENUMERATED {ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30,

 ms40,ms50, ms60, ms80,ms100, ms200,ms300, ms500,

 ms750, ms1280, ms1920, ms2560, spare10, spare9, spare8,

 spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL, --Need R

 defaultDownlinkBWP-Id BWP-Id OPTIONAL, -- Need S

 uplinkConfig UplinkConfig OPTIONAL, -- Need M

 supplementaryUplink UplinkConfig OPTIONAL, -- Need M

 pdcch-ServingCellConfig SetupRelease { PDCCH-ServingCellConfig } OPTIONAL, -- Need M

 pdsch-ServingCellConfig SetupRelease { PDSCH-ServingCellConfig } OPTIONAL, -- Need M

 csi-MeasConfig SetupRelease { CSI-MeasConfig } OPTIONAL, -- Need M

 sCellDeactivationTimer ENUMERATED {ms20, ms40, ms80, ms160, ms200, ms240,

 ms320, ms400, ms480, ms520, ms640, ms720,

 ms840, ms1280, spare2,spare1} OPTIONAL, -- Cond ServingCellWithoutPUCCH

 crossCarrierSchedulingConfig CrossCarrierSchedulingConfig OPTIONAL, -- Need M

 tag-Id TAG-Id,

 dummy ENUMERATED {enabled} OPTIONAL, -- Need R

 pathlossReferenceLinking ENUMERATED {spCell, sCell} OPTIONAL, -- Cond SCellOnly

 servingCellMO MeasObjectId OPTIONAL, -- Cond MeasObject

 ...,

 [[

 lte-CRS-ToMatchAround SetupRelease { RateMatchPatternLTE-CRS } OPTIONAL, -- Need M

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

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

 downlinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

 ]],

 [[

 firstWithinActiveTimeBWP-Id-r16 BWP-Id OPTIONAL, -- Cond MultipleNonDormantBWP

 firstOutsideActiveTimeBWP-Id-r16 BWP-Id OPTIONAL -- Cond MultipleNonDormantBWP-WUS

 ]]

}

UplinkConfig ::= SEQUENCE {

 initialUplinkBWP BWP-UplinkDedicated OPTIONAL, -- Need M

 uplinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

 uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink OPTIONAL, -- Need N

 firstActiveUplinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

 pusch-ServingCellConfig SetupRelease { PUSCH-ServingCellConfig } OPTIONAL, -- Need M

 carrierSwitching SetupRelease { SRS-CarrierSwitching } OPTIONAL, -- Need M

 ...,

 [[

 powerBoostPi2BPSK BOOLEAN OPTIONAL, -- Need M

 uplinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

 ]]

}

-- TAG-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *ServingCellConfig* field descriptions |
| ***bwp-InactivityTimer***The duration in ms after which the UE falls back to the default Bandwidth Part (see TS 38.321 [3], clause 5.15). When the network releases the timer configuration, the UE stops the timer without switching to the default BWP. |
| ***crossCarrierSchedulingConfig***Indicates whether this serving cell is cross-carrier scheduled by another serving cell or whether it cross-carrier schedules another serving cell. |
| ***defaultDownlinkBWP-Id***The initial bandwidth part is referred to by BWP-Id = 0. ID of the downlink bandwidth part to be used upon expiry of the BWP inactivity timer. This field is UE specific. When the field is absent the UE uses the initial BWP as default BWP. (see TS 38.213 [13], clause 12 and TS 38.321 [3], clause 5.15). |
| ***downlinkBWP-ToAddModList***List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12). |
| ***downlinkBWP-ToReleaseList***List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12). |
| ***downlinkChannelBW-PerSCS-List***A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *DownlinkConfigCommon* / *DownlinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |
| ***firstActiveDownlinkBWP-Id***If configured for an SpCell, this field contains the ID of the DL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.If configured for an SCell, this field contains the ID of the downlink bandwidth part to be used upon MAC-activation of an SCell. The initial bandwidth part is referred to by BWP-Id = 0.Upon PCell change and PSCell addition/change, the network sets the *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* to the same value. |
| ***initialDownlinkBWP***The dedicated (UE-specific) configuration for the initial downlink bandwidth-part (i.e. DL BWP#0). If any of the optional IEs are configured within this IE, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***lte-CRS-ToMatchAround***Parameters to determine an LTE CRS pattern that the UE shall rate match around. |
| ***pathlossReferenceLinking***Indicates whether UE shall apply as pathloss reference either the downlink of SpCell (PCell for MCG or PSCell for SCG) or of SCell that corresponds with this uplink (see TS 38.213 [13], clause 7). |
| ***pdsch-ServingCellConfig***PDSCH related parameters that are not BWP-specific. |
| ***rateMatchPatternToAddModList***Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology. See TS 38.214 [19], clause 5.1.2.2.3. |
| ***sCellDeactivationTimer***SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity. |
| ***servingCellMO****measObjectId* of the *MeasObjectNR* in *MeasConfig* which is associated to the serving cell. For this *MeasObjectNR*, the following relationship applies between this MeasObjectNR and *frequencyInfoDL* in *ServingCellConfigCommon* of the serving cell: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* and if *csi-rs-ResourceConfigMobility* is configured, the value of its *subcarrierSpacing* is present in one entry of the *scs-SpecificCarrierList*, *csi-RS-CellListMobility* includes an entry corresponding to the serving cell (with *cellId* equal to *physCellId* in *ServingCellConfigCommon*) and the frequency range indicated by the *csi-rs-MeasurementBW* of the entry in *csi-RS-CellListMobility* is included in the frequency range indicated by in the entry of the *scs-SpecificCarrierList*.  |
| ***supplementaryUplink***Network may configure this field only when *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. |
| ***tag-Id***Timing Advance Group ID, as specified in TS 38.321 [3], which this cell belongs to. |
| ***uplinkConfig***Network may configure this field only when *uplinkConfigCommon* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. |

|  |
| --- |
| *UplinkConfig* field descriptions |
| ***carrierSwitching***Includes parameters for configuration of carrier based SRS switching (see TS 38.214 [19], clause 6.2.1.3. |
| ***firstActiveUplinkBWP-Id***If configured for an SpCell, this field contains the ID of the UL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.If configured for an SCell, this field contains the ID of the uplink bandwidth part to be used upon MAC-activation of an SCell. The initial bandwidth part is referred to by BandiwdthPartId = 0. |
| ***initialUplinkBWP***The dedicated (UE-specific) configuration for the initial uplink bandwidth-part (i.e. UL BWP#0). If any of the optional IEs are configured within this IE as part of the IE *uplinkConfig*, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***powerBoostPi2BPSK***If this field is set to *true*, the UE determines the maximum output power for PUCCH/PUSCH transmissions that use pi/2 BPSK modulation according to TS 38.101-1 [15], clause 6.2.4. |
| ***pusch-ServingCellConfig***PUSCH related parameters that are not BWP-specific. |
| ***uplinkBWP-ToAddModList***The additional bandwidth parts for uplink to be added or modified. In case of TDD uplink- and downlink BWP with the same *bandwidthPartId* are considered as a BWP pair and must have the same center frequency. |
| ***uplinkBWP-ToReleaseList***The additional bandwidth parts for uplink to be released. |
| ***uplinkChannelBW-PerSCS-List***A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *UplinkConfigCommon* / *UplinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |

NOTE 1: If the dedicated part of initial UL/DL BWP configuration is absent, the initial BWP can be used but with some limitations. For example, changing to another BWP requires *RRCReconfiguration* since DCI format 1\_0 doesn't support DCI-based switching.

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *MeasObject* | This field is mandatory present for the SpCell if the UE has a *measConfig*, and it is optionally present, Need M, for SCells. |
| *MultipleNonDormantBWP* | The field is mandatory present when the SCell is configured with more than one *BWP-DownlinkDedicated* with *pdcch-Config* present, otherwise it is absent. |
| *MultipleNonDormantBWP-WUS* | The field is mandatory present when the SCell is configured with WUS and with more than one *BWP-DownlinkDedicated* with *pdcch-Config* present, otherwise it is absent. |
| *SCellOnly* | This field is optionally present, Need R, for SCells. It is absent otherwise.  |
| *ServingCellWithoutPUCCH* | This field is optionally present, Need S, for SCells except PUCCH SCells. It is absent otherwise. |
| *SyncAndCellAdd* | This field is mandatory present for a SpCell upon PCell change and PSCell addition/change and upon *RRCSetup*/*RRCResume*.The field is mandatory present for an SCell upon addition.For SpCell, the field is optionally present, Need N, upon reconfiguration without *reconfigurationWithSync*.In all other cases the field is absent. |
| *TDD* | This field is optionally present, Need R, for TDD cells. It is absent otherwise. |

*END OF CHANGES*

START OF CHANGES

## 6.4 RRC multiplicity and type constraint values

### – Multiplicity and type constraint definitions

-- ASN1START

-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-START

maxNrofFFS INTEGER ::= 65536 -- FFS

maxBandComb INTEGER ::= 65536 -- Maximum number of DL band combinations

maxCellBlack INTEGER ::= 16 -- Maximum number of NR blacklisted cell ranges in SIB3, SIB4

maxCellInter INTEGER ::= 16 -- Maximum number of inter-Freq cells listed in SIB4

maxCellIntra INTEGER ::= 16 -- Maximum number of intra-Freq cells listed in SIB3

maxCellMeasEUTRA INTEGER ::= 32 -- Maximum number of cells in E-UTRAN

maxCellMeasIdle-r16 INTEGER ::= 65535 -- Maximum number of cells per carrier for idle/inactive measurements is FFS

maxEARFCN INTEGER ::= 262143 -- Maximum value of E-UTRA carrier frequency

maxEUTRA-CellBlack INTEGER ::= 16 -- Maximum number of E-UTRA blacklisted physical cell identity ranges

 -- in SIB5

maxEUTRA-NS-Pmax INTEGER ::= 8 -- Maximum number of NS and P-Max values per band

maxMultiBands INTEGER ::= 8 -- Maximum number of additional frequency bands that a cell belongs to

maxNARFCN INTEGER ::= 3279165 -- Maximum value of NR carrier frequency

maxNR-NS-Pmax INTEGER ::= 8 -- Maximum number of NS and P-Max values per band

maxFreqIdle-r16 INTEGER ::= 65535 -- Maximum number of carrier frequencies for idle/inactive measurements is FFS

maxNrofServingCells INTEGER ::= 32 -- Max number of serving cells (SpCells + SCells)

maxNrofServingCells-1 INTEGER ::= 31 -- Max number of serving cells (SpCell + SCells) per cell group

maxNrofAggregatedCellsPerCellGroup INTEGER ::= 16

maxNrofSCells INTEGER ::= 31 -- Max number of secondary serving cells per cell group

maxNrofCellMeas INTEGER ::= 32 -- Maximum number of entries in each of the cell lists in a measurement

 -- object

maxNrofSS-BlocksToAverage INTEGER ::= 16 -- Max number for the (max) number of SS blocks to average to determine cell

 -- measurement

maxNrofCSI-RS-ResourcesToAverage INTEGER ::= 16 -- Max number for the (max) number of CSI-RS to average to determine cell

 -- measurement

maxNrofDL-Allocations INTEGER ::= 16 -- Maximum number of PDSCH time domain resource allocations

maxNrofSR-ConfigPerCellGroup INTEGER ::= 8 -- Maximum number of SR configurations per cell group

maxLCG-ID INTEGER ::= 7 -- Maximum value of LCG ID

maxLC-ID INTEGER ::= 32 -- Maximum value of Logical Channel ID

maxNrofTAGs INTEGER ::= 4 -- Maximum number of Timing Advance Groups

maxNrofTAGs-1 INTEGER ::= 3 -- Maximum number of Timing Advance Groups minus 1

maxNrofBWPs INTEGER ::= 4 -- Maximum number of BWPs per serving cell

maxNrofCombIDC INTEGER ::= 128 -- Maximum number of reported MR-DC combinations for IDC

maxNrofSymbols-1 INTEGER ::= 13 -- Maximum index identifying a symbol within a slot (14 symbols, indexed

 -- from 0..13)

maxNrofSlots INTEGER ::= 320 -- Maximum number of slots in a 10 ms period

maxNrofSlots-1 INTEGER ::= 319 -- Maximum number of slots in a 10 ms period minus 1

maxNrofPhysicalResourceBlocks INTEGER ::= 275 -- Maximum number of PRBs

maxNrofPhysicalResourceBlocks-1 INTEGER ::= 274 -- Maximum number of PRBs minus 1

maxNrofPhysicalResourceBlocksPlus1 INTEGER ::= 276 -- Maximum number of PRBs plus 1

maxNrofControlResourceSets-1 INTEGER ::= 11 -- Max number of CoReSets configurable on a serving cell minus 1

maxCoReSetDuration INTEGER ::= 3 -- Max number of OFDM symbols in a control resource set

maxNrofSearchSpaces-1 INTEGER ::= 39 -- Max number of Search Spaces minus 1

maxSFI-DCI-PayloadSize INTEGER ::= 128 -- Max number payload of a DCI scrambled with SFI-RNTI

maxSFI-DCI-PayloadSize-1 INTEGER ::= 127 -- Max number payload of a DCI scrambled with SFI-RNTI minus 1

maxINT-DCI-PayloadSize INTEGER ::= 126 -- Max number payload of a DCI scrambled with INT-RNTI

maxINT-DCI-PayloadSize-1 INTEGER ::= 125 -- Max number payload of a DCI scrambled with INT-RNTI minus 1

maxNrofRateMatchPatterns INTEGER ::= 4 -- Max number of rate matching patterns that may be configured

maxNrofRateMatchPatterns-1 INTEGER ::= 3 -- Max number of rate matching patterns that may be configured minus 1

maxNrofRateMatchPatternsPerGroup INTEGER ::= 8 -- Max number of rate matching patterns that may be configured in one group

maxNrofCSI-ReportConfigurations INTEGER ::= 48 -- Maximum number of report configurations

maxNrofCSI-ReportConfigurations-1 INTEGER ::= 47 -- Maximum number of report configurations minus 1

maxNrofCSI-ResourceConfigurations INTEGER ::= 112 -- Maximum number of resource configurations

maxNrofCSI-ResourceConfigurations-1 INTEGER ::= 111 -- Maximum number of resource configurations minus 1

maxNrofAP-CSI-RS-ResourcesPerSet INTEGER ::= 16

maxNrOfCSI-AperiodicTriggers INTEGER ::= 128 -- Maximum number of triggers for aperiodic CSI reporting

maxNrofReportConfigPerAperiodicTrigger INTEGER ::= 16 -- Maximum number of report configurations per trigger state for aperiodic

 -- reporting

maxNrofNZP-CSI-RS-Resources INTEGER ::= 192 -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources

maxNrofNZP-CSI-RS-Resources-1 INTEGER ::= 191 -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources minus 1

maxNrofNZP-CSI-RS-ResourcesPerSet INTEGER ::= 64 -- Maximum number of NZP CSI-RS resources per resource set

maxNrofNZP-CSI-RS-ResourceSets INTEGER ::= 64 -- Maximum number of NZP CSI-RS resources per cell

maxNrofNZP-CSI-RS-ResourceSets-1 INTEGER ::= 63 -- Maximum number of NZP CSI-RS resources per cell minus 1

maxNrofNZP-CSI-RS-ResourceSetsPerConfig INTEGER ::= 16 -- Maximum number of resource sets per resource configuration

maxNrofNZP-CSI-RS-ResourcesPerConfig INTEGER ::= 128 -- Maximum number of resources per resource configuration

maxNrofZP-CSI-RS-Resources INTEGER ::= 32 -- Maximum number of Zero-Power (ZP) CSI-RS resources

maxNrofZP-CSI-RS-Resources-1 INTEGER ::= 31 -- Maximum number of Zero-Power (ZP) CSI-RS resources minus 1

maxNrofZP-CSI-RS-ResourceSets-1 INTEGER ::= 15

maxNrofZP-CSI-RS-ResourcesPerSet INTEGER ::= 16

maxNrofZP-CSI-RS-ResourceSets INTEGER ::= 16

maxNrofCSI-IM-Resources INTEGER ::= 32 -- Maximum number of CSI-IM resources. See CSI-IM-ResourceMax in 38.214.

maxNrofCSI-IM-Resources-1 INTEGER ::= 31 -- Maximum number of CSI-IM resources minus 1. See CSI-IM-ResourceMax

 -- in 38.214.

maxNrofCSI-IM-ResourcesPerSet INTEGER ::= 8 -- Maximum number of CSI-IM resources per set. See CSI-IM-ResourcePerSetMax

 -- in 38.214

maxNrofCSI-IM-ResourceSets INTEGER ::= 64 -- Maximum number of NZP CSI-IM resources per cell

maxNrofCSI-IM-ResourceSets-1 INTEGER ::= 63 -- Maximum number of NZP CSI-IM resources per cell minus 1

maxNrofCSI-IM-ResourceSetsPerConfig INTEGER ::= 16 -- Maximum number of CSI IM resource sets per resource configuration

maxNrofCSI-SSB-ResourcePerSet INTEGER ::= 64 -- Maximum number of SSB resources in a resource set

maxNrofCSI-SSB-ResourceSets INTEGER ::= 64 -- Maximum number of CSI SSB resource sets per cell

maxNrofCSI-SSB-ResourceSets-1 INTEGER ::= 63 -- Maximum number of CSI SSB resource sets per cell minus 1

maxNrofCSI-SSB-ResourceSetsPerConfig INTEGER ::= 1 -- Maximum number of CSI SSB resource sets per resource configuration

maxNrofFailureDetectionResources INTEGER ::= 10 -- Maximum number of failure detection resources

maxNrofFailureDetectionResources-1 INTEGER ::= 9 -- Maximum number of failure detection resources minus 1

maxNrofObjectId INTEGER ::= 64 -- Maximum number of measurement objects

maxNrofPageRec INTEGER ::= 32 -- Maximum number of page records

maxNrofPCI-Ranges INTEGER ::= 8 -- Maximum number of PCI ranges

maxPLMN INTEGER ::= 12 -- Maximum number of PLMNs broadcast and reported by UE at establisghment

maxNrofCSI-RS-ResourcesRRM INTEGER ::= 96 -- Maximum number of CSI-RS resources for an RRM measurement object

maxNrofCSI-RS-ResourcesRRM-1 INTEGER ::= 95 -- Maximum number of CSI-RS resources for an RRM measurement object minus 1

maxNrofMeasId INTEGER ::= 64 -- Maximum number of configured measurements

maxNrofQuantityConfig INTEGER ::= 2 -- Maximum number of quantity configurations

maxNrofCSI-RS-CellsRRM INTEGER ::= 96 -- Maximum number of cells with CSI-RS resources for an RRM measurement

 -- object

maxNrofSRS-ResourceSets INTEGER ::= 16 -- Maximum number of SRS resource sets in a BWP.

maxNrofSRS-ResourceSets-1 INTEGER ::= 15 -- Maximum number of SRS resource sets in a BWP minus 1.

maxNrofSRS-Resources INTEGER ::= 64 -- Maximum number of SRS resources.

maxNrofSRS-Resources-1 INTEGER ::= 63 -- Maximum number of SRS resources in an SRS resource set minus 1.

maxNrofSRS-ResourcesPerSet INTEGER ::= 16 -- Maximum number of SRS resources in an SRS resource set

maxNrofSRS-TriggerStates-1 INTEGER ::= 3 -- Maximum number of SRS trigger states minus 1, i.e., the largest code

 -- point.

maxNrofSRS-TriggerStates-2 INTEGER ::= 2 -- Maximum number of SRS trigger states minus 2.

maxRAT-CapabilityContainers INTEGER ::= 8 -- Maximum number of interworking RAT containers (incl NR and MRDC)

maxSimultaneousBands INTEGER ::= 32 -- Maximum number of simultaneously aggregated bands

maxNrofSlotFormatCombinationsPerSet INTEGER ::= 512 -- Maximum number of Slot Format Combinations in a SF-Set.

maxNrofSlotFormatCombinationsPerSet-1 INTEGER ::= 511 -- Maximum number of Slot Format Combinations in a SF-Set minus 1.

maxNrofPUCCH-Resources INTEGER ::= 128

maxNrofPUCCH-Resources-1 INTEGER ::= 127

maxNrofPUCCH-ResourceSets INTEGER ::= 4 -- Maximum number of PUCCH Resource Sets

maxNrofPUCCH-ResourceSets-1 INTEGER ::= 3 -- Maximum number of PUCCH Resource Sets minus 1.

maxNrofPUCCH-ResourcesPerSet INTEGER ::= 32 -- Maximum number of PUCCH Resources per PUCCH-ResourceSet

maxNrofPUCCH-P0-PerSet INTEGER ::= 8 -- Maximum number of P0-pucch present in a p0-pucch set

maxNrofPUCCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUCCH power control.

maxNrofPUCCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUCCH power

 -- control minus 1.

maxNrofP0-PUSCH-AlphaSets INTEGER ::= 30 -- Maximum number of P0-pusch-alpha-sets (see 38,213, clause 7.1)

maxNrofP0-PUSCH-AlphaSets-1 INTEGER ::= 29 -- Maximum number of P0-pusch-alpha-sets minus 1 (see 38,213, clause 7.1)

maxNrofPUSCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUSCH power control.

maxNrofPUSCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUSCH power

 -- control minus 1.

maxNrofNAICS-Entries INTEGER ::= 8 -- Maximum number of supported NAICS capability set

maxBands INTEGER ::= 1024 -- Maximum number of supported bands in UE capability.

maxBandsMRDC INTEGER ::= 1280

maxBandsEUTRA INTEGER ::= 256

maxCellReport INTEGER ::= 8

maxDRB INTEGER ::= 29 -- Maximum number of DRBs (that can be added in DRB-ToAddModLIst).

maxFreq INTEGER ::= 8 -- Max number of frequencies.

maxFreqIDC-MRDC INTEGER ::= 32 -- Maximum number of candidate NR frequencies for MR-DC IDC indication

maxNrofCandidateBeams INTEGER ::= 16 -- Max number of PRACH-ResourceDedicatedBFR that in BFR config.

maxNrofPCIsPerSMTC INTEGER ::= 64 -- Maximun number of PCIs per SMTC.

maxNrofQFIs INTEGER ::= 64

maxNrOfSemiPersistentPUSCH-Triggers INTEGER ::= 64 -- Maximum number of triggers for semi persistent reporting on PUSCH

maxNrofSR-Resources INTEGER ::= 8 -- Maximum number of SR resources per BWP in a cell.

maxNrofSlotFormatsPerCombination INTEGER ::= 256

maxNrofSpatialRelationInfos INTEGER ::= 8

maxNrofIndexesToReport INTEGER ::= 32

maxNrofIndexesToReport2 INTEGER ::= 64

maxNrofSSBs-1 INTEGER ::= 63 -- Maximum number of SSB resources in a resource set minus 1.

maxNrofS-NSSAI INTEGER ::= 8 -- Maximum number of S-NSSAI.

maxNrofTCI-StatesPDCCH INTEGER ::= 64

maxNrofTCI-States INTEGER ::= 128 -- Maximum number of TCI states.

maxNrofTCI-States-1 INTEGER ::= 127 -- Maximum number of TCI states minus 1.

maxNrofUL-Allocations INTEGER ::= 16 -- Maximum number of PUSCH time domain resource allocations.

maxQFI INTEGER ::= 63

maxRA-CSIRS-Resources INTEGER ::= 96

maxRA-OccasionsPerCSIRS INTEGER ::= 64 -- Maximum number of RA occasions for one CSI-RS

maxRA-Occasions-1 INTEGER ::= 511 -- Maximum number of RA occasions in the system

maxRA-SSB-Resources INTEGER ::= 64

maxSCSs INTEGER ::= 5

maxSecondaryCellGroups INTEGER ::= 3

maxNrofServingCellsEUTRA INTEGER ::= 32

maxMBSFN-Allocations INTEGER ::= 8

maxNrofMultiBands INTEGER ::= 8

maxCellSFTD INTEGER ::= 3 -- Maximum number of cells for SFTD reporting

maxReportConfigId INTEGER ::= 64

maxNrofCodebooks INTEGER ::= 16 -- Maximum number of codebooks suppoted by the UE

maxNrofCSI-RS-Resources INTEGER ::= 7 -- Maximum number of codebook resources supported by the UE

maxNrofSRI-PUSCH-Mappings INTEGER ::= 16

maxNrofSRI-PUSCH-Mappings-1 INTEGER ::= 15

maxSIB INTEGER::= 32 -- Maximum number of SIBs

maxSI-Message INTEGER::= 32 -- Maximum number of SI messages

maxPO-perPF INTEGER ::= 4 -- Maximum number of paging occasion per paging frame

maxAccessCat-1 INTEGER ::= 63 -- Maximum number of Access Categories minus 1

maxBarringInfoSet INTEGER ::= 8 -- Maximum number of Access Categories

maxCellEUTRA INTEGER ::= 8 -- Maximum number of E-UTRA cells in SIB list

maxEUTRA-Carrier INTEGER ::= 8 -- Maximum number of E-UTRA carriers in SIB list

maxPLMNIdentities INTEGER ::= 8 -- Maximum number of PLMN identites in RAN area configurations

maxDownlinkFeatureSets INTEGER ::= 1024 -- (for NR DL) Total number of FeatureSets (size of the pool)

maxUplinkFeatureSets INTEGER ::= 1024 -- (for NR UL) Total number of FeatureSets (size of the pool)

maxEUTRA-DL-FeatureSets INTEGER ::= 256 -- (for E-UTRA) Total number of FeatureSets (size of the pool)

maxEUTRA-UL-FeatureSets INTEGER ::= 256 -- (for E-UTRA) Total number of FeatureSets (size of the pool)

maxFeatureSetsPerBand INTEGER ::= 128 -- (for NR) The number of feature sets associated with one band.

maxPerCC-FeatureSets INTEGER ::= 1024 -- (for NR) Total number of CC-specific FeatureSets (size of the pool)

maxFeatureSetCombinations INTEGER ::= 1024 -- (for MR-DC/NR)Total number of Feature set combinations (size of the

 -- pool)

maxInterRAT-RSTD-Freq INTEGER ::= 3

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

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

# 7 Variables and constants

## 7.1 Timers

### 7.1.1 Timers (Informative)

| Timer | Start | Stop | At expiry |
| --- | --- | --- | --- |
| T300 | Upon transmission of *RRCSetupRequest.* | Upon reception of *RRCSetup* or *RRCReject* message, cell re-selection and upon abortion of connection establishment by upper layers. | Perform the actions as specified in 5.3.3.7.  |
| T301 | Upon transmission of *RRCReestabilshmentRequest* | Upon reception of *RRCReestablishment* or *RRCSetup* message as well as when the selected cell becomes unsuitable | Go to RRC\_IDLE |
| T302 | Upon reception of *RRCReject* while performing RRC connection establishment or resume, upon reception of *RRCRelease* with *waitTime*. | Upon entering RRC\_CONNECTED or RRC\_IDLE, upon cell re-selection and upon reception of *RRCReject* message. | Inform upper layers about barring alleviation as specified in 5.3.14.4 |
| T304 | Upon reception of *RRCReconfiguration* message including *reconfigurationWithSync* | Upon successful completion of random access on the corresponding SpCellFor T304 of SCG, upon SCG release | For T304 of MCG, in case of the handover from NR or intra-NR handover, initiate the RRC re-establishment procedure; In case of handover to NR, perform the actions defined in the specifications applicable for the source RAT.For T304 of SCG, inform network about the reconfiguration with sync failure by initiating the SCG failure information procedure as specified in 5.7.3. |
| T310 | Upon detecting physical layer problems for the SpCell 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 SpCell, upon receiving RRCReconfiguration with *reconfigurationWithSync* for that cell group, and upon initiating the connection re-establishment procedure.Upon SCG release, if the T310 is kept in SCG. | If the T310 is kept in MCG: If AS security is not activated: go to RRC\_IDLE else: initiate the MCG failure information procedure as specified in 5.7.y or the connection re-establishment procedure as specified in 5.3.7.If the T310 is kept in SCG, Inform E-UTRAN/NR about the SCG radio link failure by initiating the SCG failure information procedure as specified in 5.7.3. |
| T311 | Upon initiating the RRC connection re-establishment procedure | Upon selection of a suitable NR cell or a cell using another RAT. | Enter RRC\_IDLE |
| T316 | Upon transmission of the *MCGFailureInformation* message | Upon resumption of MCG transmission, upon reception of *RRCRelease,* or upon initiating the re-establishment procedure,  | Perform the actions as specified in 5.7.y.5. |
| T319 | Upon transmission of *RRCResumeRequest* or *RRCResumeRequest1.* | Upon reception of *RRCResume,* *RRCSetup, RRCRelease, RRCRelease* with *suspendConfig* or *RRCReject* message, cell re-selection and upon abortion of connection establishment by upper layers. | Perform the actions as specified in 5.3.13.5. |
| T320 | Upon reception of *t320* or upon cell (re)selection to NR from another RAT with validity time configured for dedicated priorities (in which case the remaining validity time is applied). | Upon entering RRC\_CONNECTED, upon reception of *RRCRelease*, 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). | 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 *cgi-info*, 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. |
| T322 | Upon receving *measConfig* including *reportConfigNR* with the purpose set to *reportSFTD* and *drx-SFTD-NeighMeas* is set to *true*. | Upon acquiring the SFTD measurement results, upon receiving *measConfig* that includes removal of the *reportConfig* with the *purpose* set to *reportSFTD*. | Initiate the measurement reporting procedure, stop performing the related measurements*.* |
| T325 | Upon reception of *RRCRelease* message with *deprioritisationTimer*. |  | Stop deprioritisation of all frequencies or NR signalled by *RRCRelease.* |
| T331 | Upon receiving *RRCRelease* message with *measIdleDuration* | Upon receiving *RRCSetup, RRCResume*, *RRCRelease* with idle/inactive measurement configuration, upon reselecting to cell that does not belong to *validityArea* (if configured)*,* or upon cell re-selection to another RAT*.* | Perform the actions as specified in 5.7.x.3. |
| T342 | Upon transmitting *UEAssistanceInformation* message with *DelayBudgetReport*. | Upon initiating the connection re-establishment/resume procedures, and upon receiving *delayBudgetReportingConfig* set to *release.* | No action. |
| T345 | Upon transmitting *UEAssistanceInformation* message with *overheatingAssistance* | Upon initiating the connection re-establishment procedure and upon initiating the connection resumption procedure | No action. |
| T380 | Upon reception of t380 in *RRCRelease.* | Upon reception of *RRCResume*, *RRCSetup* or *RRCRelease*. | Perform the actions as specified in 5.3.13. |
| T390 | When access attempt is barred at access barring check for an Access Category. The UE maintains one instance of this timer per Access Category. | Upon cell (re)selection, upon entering RRC\_CONNECTED, upon reception of *RRCReconfiguration* including *reconfigurationWithSync*, upon change of PCell while in RRC\_CONNECTED, upon reception of *MobilityFromNRCommand*, or upon reception of *RRCRelease*. | Perform the actions as specified in 5.3.14.4. |

*END OF CHANGES*

START OF CHANGES

## 7.4 UE variables

#### – *NR-UE-Variables*

This ASN.1 segment is the start of the NR UE variable definitions.

-- ASN1START

-- NR-UE-VARIABLES-START

NR-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

 CellIdentity,

 EUTRA-PhysCellId,

 MeasId,

 MeasIdToAddModList,

 MeasIdleCarrierEUTRA-r16,

 MeasIdleCarrierNR-r16,

 MeasResultIdleEUTRA-r16,

 MeasResultIdleNR-r16,

 MeasObjectToAddModList,

 PhysCellId,

 RNTI-Value,

 ReportConfigToAddModList,

 RSRP-Range,

 QuantityConfig,

 maxNrofCellMeas,

 maxNrofMeasId,

 maxFreqIdle-r16,

 ValidityAreaList-r16

FROM NR-RRC-Definitions;

-- NR-UE-VARIABLES-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

– *VarMeasIdleConfig*

The UE variable *VarMeasIdleConfig* includes the configuration of the measurements to be performed by the UE while in RRC\_IDLE or RRC\_INACTIVE for NR inter-frequency and inter-RAT (i.e. EUTRA) measurements.

***VarMeasIdleConfig* UE variable**

-- ASN1START

-- TAG-VARMEASIDLECONFIG-START

VarMeasIdleConfig-r16 ::= SEQUENCE {

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

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

 measIdleDuration-r16 ENUMERATED {ffs},

 validityAreaList-r16 ValidityAreaList-r16 OPTIONAL

}

-- TAG-VARMEASIDLECONFIG-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

– *VarMeasIdleReport*

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

***VarMeasIdleReport* UE variable**

-- ASN1START

-- TAG-VARMEASIDLEREPORT-START

VarMeasIdleReport-r16 ::= SEQUENCE {

 measReportIdleNR-r16 MeasResultIdleNR-r16,

 measReportIdleEUTRA-r16 MeasResultIdleEUTRA-r16

}

-- TAG-VARMEASIDLEREPORT-STOP

-- ASN1STOP

*END OF CHANGES*

START OF CHANGES

# 11 Radio information related interactions between network nodes

## 11.2 Inter-node RRC messages

### 11.2.2 Message definitions

#### – *CG-Config*

This message is used to transfer the SCG radio configuration as generated by the SgNB or SeNB. It can also be used by a CU to request a DU to perform certain actions, e.g. to request the DU to perform a new lower layer configuration.

Direction: Secondary gNB or eNB to master gNB or eNB, alternatively CU to DU.

*CG-Config* message

-- ASN1START

-- TAG-CG-CONFIG-START

CG-Config ::= SEQUENCE {

 criticalExtensions CHOICE {

 c1 CHOICE{

 cg-Config CG-Config-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

CG-Config-IEs ::= SEQUENCE {

 scg-CellGroupConfig OCTET STRING (CONTAINING RRCReconfiguration) OPTIONAL,

 scg-RB-Config OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL,

 configRestrictModReq ConfigRestrictModReqSCG OPTIONAL,

 drx-InfoSCG DRX-Info OPTIONAL,

 candidateCellInfoListSN OCTET STRING (CONTAINING MeasResultList2NR) OPTIONAL,

 measConfigSN MeasConfigSN OPTIONAL,

 selectedBandCombination BandCombinationInfoSN OPTIONAL,

 fr-InfoListSCG FR-InfoList OPTIONAL,

 candidateServingFreqListNR CandidateServingFreqListNR OPTIONAL,

 nonCriticalExtension CG-Config-v1540-IEs OPTIONAL

}

CG-Config-v1540-IEs ::= SEQUENCE {

 pSCellFrequency ARFCN-ValueNR OPTIONAL,

 reportCGI-RequestNR SEQUENCE {

 requestedCellInfo SEQUENCE {

 ssbFrequency ARFCN-ValueNR,

 cellForWhichToReportCGI PhysCellId

 } OPTIONAL

 } OPTIONAL,

 ph-InfoSCG PH-TypeListSCG OPTIONAL,

 nonCriticalExtension CG-Config-v1560-IEs OPTIONAL

}

CG-Config-v1560-IEs ::= SEQUENCE {

 pSCellFrequencyEUTRA ARFCN-ValueEUTRA OPTIONAL,

 scg-CellGroupConfigEUTRA OCTET STRING OPTIONAL,

 candidateCellInfoListSN-EUTRA OCTET STRING OPTIONAL,

 candidateServingFreqListEUTRA CandidateServingFreqListEUTRA OPTIONAL,

 needForGaps ENUMERATED {true} OPTIONAL,

 drx-ConfigSCG DRX-Config OPTIONAL,

 reportCGI-RequestEUTRA SEQUENCE {

 requestedCellInfoEUTRA SEQUENCE {

 eutraFrequency ARFCN-ValueEUTRA,

 cellForWhichToReportCGI-EUTRA EUTRA-PhysCellId

 } OPTIONAL

 } OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

PH-TypeListSCG ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF PH-InfoSCG

PH-InfoSCG ::= SEQUENCE {

 servCellIndex ServCellIndex,

 ph-Uplink PH-UplinkCarrierSCG,

 ph-SupplementaryUplink PH-UplinkCarrierSCG OPTIONAL,

 ...

}

PH-UplinkCarrierSCG ::= SEQUENCE{

 ph-Type1or3 ENUMERATED {type1, type3},

 ...

}

MeasConfigSN ::= SEQUENCE {

 measuredFrequenciesSN SEQUENCE (SIZE (1..maxMeasFreqsSN)) OF NR-FreqInfo OPTIONAL,

 ...

}

NR-FreqInfo ::= SEQUENCE {

 measuredFrequency ARFCN-ValueNR OPTIONAL,

 ...

}

ConfigRestrictModReqSCG ::= SEQUENCE {

 requestedBC-MRDC BandCombinationInfoSN OPTIONAL,

 requestedP-MaxFR1 P-Max OPTIONAL,

 ...,

 [[

 requestedPDCCH-BlindDetectionSCG INTEGER (1..15) OPTIONAL,

 requestedP-MaxEUTRA P-Max OPTIONAL

 ]],

 [[

 requestedP-MaxFR1-r16 P-Max OPTIONAL

 ]]

}

BandCombinationIndex ::= INTEGER (1..maxBandComb)

BandCombinationInfoSN ::= SEQUENCE {

 bandCombinationIndex BandCombinationIndex,

 requestedFeatureSets FeatureSetEntryIndex

}

FR-InfoList ::= SEQUENCE (SIZE (1..maxNrofServingCells-1)) OF FR-Info

FR-Info ::= SEQUENCE {

 servCellIndex ServCellIndex,

 fr-Type ENUMERATED {fr1, fr2}

}

CandidateServingFreqListNR ::= SEQUENCE (SIZE (1.. maxFreqIDC-MRDC)) OF ARFCN-ValueNR

CandidateServingFreqListEUTRA ::= SEQUENCE (SIZE (1.. maxFreqIDC-MRDC)) OF ARFCN-ValueEUTRA

-- TAG-CG-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *CG-Config* field descriptions |
| ***candidateCellInfoListSN***Contains information regarding cells that the source secondary node suggests the target secondary gNB to consider configuring. |
| ***candidateCellInfoListSN-EUTRA***Includes the *MeasResultList3EUTRA* as specified in TS 36.331 [10]. Contains information regarding cells that the source secondary node suggests the target secondary eNB to consider configuring. This field is only used in NE-DC. |
| ***candidateServingFreqListNR, candidateServingFreqListEUTRA***Indicates frequencies of candidate serving cells for In-Device Co-existence Indication (see TS 36.331 [10]). |
| ***configRestrictModReq***Used by SN to request changes to SCG configuration restrictions previously set by MN to ensure UE capabilities are respected. E.g. can be used to request configuring an NR band combination whose use MN has previously forbidden. |
| ***drx-ConfigSCG***This field contains the complete DRX configuration of the SCG. This field is only used in NR-DC. |
| ***drx-InfoSCG***This field contains the DRX long and short cycle configuration of the SCG. This field is used in (NG)EN-DC and NE-DC. |
| ***fr-InfoListSCG***Contains information of FR information of serving cells that include PScell and SCells configured in SCG. |
| ***measuredFrequenciesSN***Used by SN to indicate a list of frequencies measured by the UE. |
| ***needForGaps***In NE-DC, indicates wheter the SN requests gNB to configure measurements gaps. |
| ***ph-InfoSCG***Power headroom information in SCG that is needed in the reception of PHR MAC CE of MCG |
| ***ph-SupplementaryUplink***Power headroom information for supplementary uplink. In the case of (NG)EN-DC and NR-DC, this field is only present when two UL carriers are configued for a serving cell and one UL carrier reports type1 PH while the other reports type 3 PH.  |
| ***ph-Type1or3***Type of power headroom for a certain serving cell in SCG (PSCell and activated SCells). Value *type1* refers to type 1 power headroom, value *type3* refers to type 3 power headroom. (See TS 38.321 [3]). |
| ***ph-Uplink***Power headroom information for uplink. |
| ***pSCellFrequency, pSCellFrequencyEUTRA***Indicates the frequency of PSCell in NR (i.e., *pSCellFrequency*) or E-UTRA (i.e., *pSCellFrequencyEUTRA*). In this version of the specification, *pSCellFrequency* is not used in NE-DC whereas *pSCellFrequencyEUTRA* is only used in NE-DC. |
| ***reportCGI-RequestNR, reportCGI-RequestEUTRA***Used by SN to indicate to MN about configuring *reportCGI* procedure. The request may optionally contain information about the cell for which SN intends to configure *reportCGI* procedure. In this version of the specification, the *reportCGI-RequestNR* is used in (NG)EN-DC and NR-DC whereas *reportCGI-RequestEUTRA* is used only for NE-DC. |
| ***requestedBC-MRDC***Used to request configuring an NR band combination and corresponding feature sets which are forbidden to use by MN (i.e. outside of the *allowedBC-ListMRDC*) to allow re-negotiation of the UE capabilities for SCG configuration. |
| ***requestedPDCCH-BlindDetectionSCG***Requested value of the reference number of cells for PDCCH blind detection allowed to be configured for the SCG. |
| ***requestedP-MaxEUTRA***Requested value for the maximum power for the serving cells the UE can use in E-UTRA SCG. This field is only used in NE-DC. |
| ***requestedP-MaxFR1***Requested value for the maximum power for the serving cells on frequency range 1 (FR1) in this secondary cell group (see TS 38.104 [12]) the UE can use in NR SCG. |
| ***requestedP-MaxFR2***Requested value for the maximum power for the serving cells on frequency range 2 (FR2) in this secondary cell group the UE can use in NR SCG. This field is only used in NR-DC. |
| ***scg-CellGroupConfig***Contains the *RRCReconfiguration* message (containing only *secondaryCellGroup* and/or *measConfig*):- to be sent to the UE, used upon SCG establishment or modification, as generated (entirely) by the (target) SgNB. In this case, the SN sets the *RRCReconfiguration* message in accordance with clause 6 e.g. regarding the "Need" or "Cond" statements. or- including the current SCG configuration of the UE, when provided in response to a query from MN, or in SN triggered SN change in order to enable delta signaling by the target SN. In this case, the SN sets the *RRCReconfiguration* message in accordance with clause 11.2.3.The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered SN change is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG (re)configuration towards the UE. This field is not applicable in NE-DC. |
| ***scg-CellGroupConfigEUTRA***Includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration*. Used to (re-)configure the SCG configuration upon SCG establishment or modification, as generated (entirely) by the (target) SeNB. This field is only used in NE-DC. |
| ***scg-RB-Config***Contains the IE *RadioBearerConfig*:- to be sent to the UE, used to (re-)configure the SCG RB configuration upon SCG establishment or modification, as generated (entirely) by the (target) SgNB or SeNB. In this case, the SN sets the *RadioBearerConfig* in accordance with clause 6, e.g. regarding the "Need" or "Cond" statements. or- including the current SCG RB configuration of the UE, when provided in response to a query from MN or in SN triggered SN change or bearer type change between SN terminated bearer to MN terminated bearer in order to enable delta signaling by the MN or target SN. In this case, the SN sets the *RadioBearerConfig* in accordance with clause 11.2.3.The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered SN change is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG RB (re)configuration. |
| ***selectedBandCombination***Indicates the band combination selected by SN in (NG)EN-DC, NE-DC, and NR-DC. The SN should inform the MN with this field whenever the band combination and/or feature set it selected for the SCG changes (i.e. even if the new selection concerns a band combination and/or feature set that is allowed by the *allowedBC-ListMRDC*) |

|  |
| --- |
| *BandCombinationInfoSN* field descriptions |
| ***bandCombinationIndex***The position of a band combination in the *supportedBandCombinationList* |
| ***requestedFeatureSets***The position in the *FeatureSetCombination* which identifies one *FeatureSetUplink*/*Downlink* for each band entry in the associated band combination |

#### *– CG-ConfigInfo*

This message is used by master eNB or gNB to request the SgNB or SeNB to perform certain actions e.g. to establish, modify or release an SCG. The message may include additional information e.g. to assist the SgNB or SeNB to set the SCG configuration. It can also be used by a CU to request a DU to perform certain actions, e.g. to establish, or modify an MCG or SCG.

Direction: Master eNB or gNB to secondary gNB or eNB, alternatively CU to DU.

*CG-ConfigInfo* message

-- ASN1START

-- TAG-CG-CONFIG-INFO-START

CG-ConfigInfo ::= SEQUENCE {

 criticalExtensions CHOICE {

 c1 CHOICE{

 cg-ConfigInfo CG-ConfigInfo-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

CG-ConfigInfo-IEs ::= SEQUENCE {

 ue-CapabilityInfo OCTET STRING (CONTAINING UE-CapabilityRAT-ContainerList) OPTIONAL,-- Cond SN-AddMod

 candidateCellInfoListMN MeasResultList2NR OPTIONAL,

 candidateCellInfoListSN OCTET STRING (CONTAINING MeasResultList2NR) OPTIONAL,

 measResultCellListSFTD-NR MeasResultCellListSFTD-NR OPTIONAL,

 scgFailureInfo SEQUENCE {

 failureType ENUMERATED { t310-Expiry, randomAccessProblem,

 rlc-MaxNumRetx, synchReconfigFailure-SCG,

 scg-reconfigFailure,

 srb3-IntegrityFailure},

 measResultSCG OCTET STRING (CONTAINING MeasResultSCG-Failure)

 } OPTIONAL,

 configRestrictInfo ConfigRestrictInfoSCG OPTIONAL,

 drx-InfoMCG DRX-Info OPTIONAL,

 measConfigMN MeasConfigMN OPTIONAL,

 sourceConfigSCG OCTET STRING (CONTAINING RRCReconfiguration) OPTIONAL,

 scg-RB-Config OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL,

 mcg-RB-Config OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL,

 mrdc-AssistanceInfo MRDC-AssistanceInfo OPTIONAL,

 nonCriticalExtension CG-ConfigInfo-v1540-IEs OPTIONAL

}

CG-ConfigInfo-v1540-IEs ::= SEQUENCE {

 ph-InfoMCG PH-TypeListMCG OPTIONAL,

 measResultReportCGI SEQUENCE {

 ssbFrequency ARFCN-ValueNR,

 cellForWhichToReportCGI PhysCellId,

 cgi-Info CGI-InfoNR

 } OPTIONAL,

 nonCriticalExtension CG-ConfigInfo-v1560-IEs OPTIONAL

}

CG-ConfigInfo-v1560-IEs ::= SEQUENCE {

 candidateCellInfoListMN-EUTRA OCTET STRING OPTIONAL,

 candidateCellInfoListSN-EUTRA OCTET STRING OPTIONAL,

 sourceConfigSCG-EUTRA OCTET STRING OPTIONAL,

 scgFailureInfoEUTRA SEQUENCE {

 failureTypeEUTRA ENUMERATED { t313-Expiry, randomAccessProblem,

 rlc-MaxNumRetx, scg-ChangeFailure},

 measResultSCG-EUTRA OCTET STRING

 } OPTIONAL,

 drx-ConfigMCG DRX-Config OPTIONAL,

 measResultReportCGI-EUTRA SEQUENCE {

 eutraFrequency ARFCN-ValueEUTRA,

 cellForWhichToReportCGI-EUTRA EUTRA-PhysCellId,

 cgi-InfoEUTRA CGI-InfoEUTRA

 } OPTIONAL,

 measResultCellListSFTD-EUTRA MeasResultCellListSFTD-EUTRA OPTIONAL,

 fr-InfoListMCG FR-InfoList OPTIONAL,

 nonCriticalExtension CG-ConfigInfo-v1570-IEs OPTIONAL

}

CG-ConfigInfo-v1570-IEs ::= SEQUENCE {

 sftdFrequencyList-NR SFTD-FrequencyList-NR OPTIONAL,

 sftdFrequencyList-EUTRA SFTD-FrequencyList-EUTRA OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

SFTD-FrequencyList-NR ::= SEQUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueNR

SFTD-FrequencyList-EUTRA ::= SEQUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueEUTRA

ConfigRestrictInfoSCG ::= SEQUENCE {

 allowedBC-ListMRDC BandCombinationInfoList OPTIONAL,

 powerCoordination-FR1 SEQUENCE {

 p-maxNR-FR1 P-Max OPTIONAL,

 p-maxEUTRA P-Max OPTIONAL,

 p-maxUE-FR1 P-Max OPTIONAL

 } OPTIONAL,

 servCellIndexRangeSCG SEQUENCE {

 lowBound ServCellIndex,

 upBound ServCellIndex

 } OPTIONAL, -- Cond SN-AddMod

 maxMeasFreqsSCG INTEGER(1..maxMeasFreqsMN) OPTIONAL,

-- TBD Late Drop: If maxMeasIdentitiesSCG is used needs to be decided after RAN4 replies to the LS on measurement requirements for MR-DC.

 maxMeasIdentitiesSCG-NR INTEGER(1..maxMeasIdentitiesMN) OPTIONAL,

 ...,

 [[

 selectedBandEntriesMNList SEQUENCE (SIZE (1..maxBandComb)) OF SelectedBandEntriesMN OPTIONAL,

 pdcch-BlindDetectionSCG INTEGER (1..15) OPTIONAL,

 maxNumberROHC-ContextSessionsSN INTEGER(0.. 16384) OPTIONAL

 ]],

 [[

 p-maxNR-FR1-MCG-r16 P-Max OPTIONAL,

 powerCoordination-FR2-r16 SEQUENCE {

 p-maxNR-FR2-MCG-r16 P-Max OPTIONAL,

 p-maxNR-FR2-SCG-r16 P-Max OPTIONAL,

 p-maxUE-FR2-r16 P-Max OPTIONAL

 } OPTIONAL

 ]]

}

SelectedBandEntriesMN ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandEntryIndex

BandEntryIndex ::= INTEGER (0.. maxNrofServingCells)

PH-TypeListMCG ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF PH-InfoMCG

PH-InfoMCG ::= SEQUENCE {

 servCellIndex ServCellIndex,

 ph-Uplink PH-UplinkCarrierMCG,

 ph-SupplementaryUplink PH-UplinkCarrierMCG OPTIONAL,

 ...

}

PH-UplinkCarrierMCG ::= SEQUENCE{

 ph-Type1or3 ENUMERATED {type1, type3},

 ...

}

BandCombinationInfoList ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationInfo

BandCombinationInfo ::= SEQUENCE {

 bandCombinationIndex BandCombinationIndex,

 allowedFeatureSetsList SEQUENCE (SIZE (1..maxFeatureSetsPerBand)) OF FeatureSetEntryIndex

}

FeatureSetEntryIndex ::= INTEGER (1.. maxFeatureSetsPerBand)

DRX-Info ::= SEQUENCE {

 drx-LongCycleStartOffset CHOICE {

 ms10 INTEGER(0..9),

 ms20 INTEGER(0..19),

 ms32 INTEGER(0..31),

 ms40 INTEGER(0..39),

 ms60 INTEGER(0..59),

 ms64 INTEGER(0..63),

 ms70 INTEGER(0..69),

 ms80 INTEGER(0..79),

 ms128 INTEGER(0..127),

 ms160 INTEGER(0..159),

 ms256 INTEGER(0..255),

 ms320 INTEGER(0..319),

 ms512 INTEGER(0..511),

 ms640 INTEGER(0..639),

 ms1024 INTEGER(0..1023),

 ms1280 INTEGER(0..1279),

 ms2048 INTEGER(0..2047),

 ms2560 INTEGER(0..2559),

 ms5120 INTEGER(0..5119),

 ms10240 INTEGER(0..10239)

 },

 shortDRX SEQUENCE {

 drx-ShortCycle ENUMERATED {

 ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,

 ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,

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

 drx-ShortCycleTimer INTEGER (1..16)

 } OPTIONAL

}

MeasConfigMN ::= SEQUENCE {

 measuredFrequenciesMN SEQUENCE (SIZE (1..maxMeasFreqsMN)) OF NR-FreqInfo OPTIONAL,

 measGapConfig SetupRelease { GapConfig } OPTIONAL,

 gapPurpose ENUMERATED {perUE, perFR1} OPTIONAL,

 ...,

 [[ measGapConfigFR2 SetupRelease { GapConfig } OPTIONAL

 ]]

}

MRDC-AssistanceInfo ::= SEQUENCE {

 affectedCarrierFreqCombInfoListMRDC SEQUENCE (SIZE (1..maxNrofCombIDC)) OF AffectedCarrierFreqCombInfoMRDC,

 ...

}

AffectedCarrierFreqCombInfoMRDC ::= SEQUENCE {

 victimSystemType VictimSystemType,

 interferenceDirectionMRDC ENUMERATED {eutra-nr, nr, other, utra-nr-other, nr-other, spare3, spare2, spare1},

 affectedCarrierFreqCombMRDC SEQUENCE {

 affectedCarrierFreqCombEUTRA AffectedCarrierFreqCombEUTRA OPTIONAL,

 affectedCarrierFreqCombNR AffectedCarrierFreqCombNR

 } OPTIONAL

}

VictimSystemType ::= SEQUENCE {

 gps ENUMERATED {true} OPTIONAL,

 glonass ENUMERATED {true} OPTIONAL,

 bds ENUMERATED {true} OPTIONAL,

 galileo ENUMERATED {true} OPTIONAL,

 wlan ENUMERATED {true} OPTIONAL,

 bluetooth ENUMERATED {true} OPTIONAL

}

AffectedCarrierFreqCombEUTRA ::= SEQUENCE (SIZE (1..maxNrofServingCellsEUTRA)) OF ARFCN-ValueEUTRA

AffectedCarrierFreqCombNR ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF ARFCN-ValueNR

-- TAG-CG-CONFIG-INFO-STOP

-- ASN1STOP

|  |
| --- |
| *CG-ConfigInfo* field descriptions |
| ***allowedBC-ListMRDC***A list of indices referring to band combinations in MR-DC capabilities from which SN is allowed to select the SCG band combination. Each entry refers to a band combination numbered according to *supportedBandCombinationList* in the *UE-MRDC-Capability* (in case of (NG)EN-DC or NE-DC) or UE-NR-Capability (in case of NR-DC) and the Feature Sets allowed for each band entry. All MR-DC band combinations indicated by this field comprise the MCG band combination, which is a superset of the MCG band(s) selected by MN. |
| ***candidateCellInfoListMN***, ***candidateCellInfoListSN***Contains information regarding cells that the master node or the source node suggests the target gNB or DU to consider configuring.For (NG)EN-DC, including CSI-RS measurement results in *candidateCellInfoListMN* is not supported in this version of the specification. For NR-DC, including SSB and/or CSI-RS measurement results in *candidateCellInfoListMN* is supported. |
| ***candidateCellInfoListMN-EUTRA***, ***candidateCellInfoListSN-EUTRA***Includes the *MeasResultList3EUTRA* as specified in TS 36.331 [10]. Contains information regarding cells that the master node or the source node suggests the target secondary eNB to consider configuring. These fields are only used in NE-DC. |
| ***configRestrictInfo***Includes fields for which SgNB is explictly indicated to observe a configuration restriction. |
| ***drx-ConfigMCG***This field contains the complete DRX configuration of the MCG. This field is only used in NR-DC. |
| ***drx-InfoMCG***This field contains the DRX long and short cycle configuration of the MCG. This field is used in (NG)EN-DC and NE-DC. |
| ***fr-InfoListMCG***Contains information of FR information of serving cells that include PCell and SCell(s) configured in MCG. |
| ***maxMeasFreqsSCG***Indicates the maximum number of NR inter-frequency carriers the SN is allowed to configure with PSCell for measurements. |
| ***maxMeasIdentitiesSCG-NR***Indicates the maximum number of allowed measurement identities that the SCG is allowed to configure. |
| ***maxNumberROHC-ContextSessionsSN***Indicates the maximum number of context sessions allowed to SN terminated bearer, excluding context sessions that leave all headers uncompressed. |
| ***measuredFrequenciesMN***Used by MN to indicate a list of frequencies measured by the UE. |
| ***measGapConfig***Indicates the FR1 and perUE measurement gap configuration configured by MN. |
| ***measGapConfigFR2***Indicates the FR2 measurement gap configuration configured by MN. |
| ***mcg-RB-Config***Contains all of the fields in the IE *RadioBearerConfig* used in MCG, used by the SN to support delta configuration to UE, for bearer type change between MN terminated bearer with NR PDCP to SN terminated bearer. It is also used to indicate the PDCP duplication related information for MN terminated split bearer (whether duplication is configured and if so, whether it is initially activated) in SN Addition/Modification procedure. Otherwise, this field is absent. |
| ***measResultReportCGI, measResultReportCGI-EUTRA***Used by MN to provide SN with CGI-Info for the cell as per SN′s request. In this version of the specification, the *measResultReportCGI* is used for (NG)EN-DC and NR-DC and the *measResultReportCGI-EUTRA* is used only for NE-DC. |
| ***measResultSCG-EUTRA***This field includes the *MeasResultSCG-FailureMRDC* IE as specified in TS 36.331 [10]. This field is only used in NE-DC. |
| ***measResultSFTD-EUTRA***SFTD measurement results between the PCell and the E-UTRA PScell in NE-DC. This field is only used in NE-DC. |
| ***mrdc-AssistanceInfo***Contains the IDC assistance information for MR-DC reported by the UE (see TS 36.331 [10]). |
| ***p-maxEUTRA***Indicates the maximum total transmit power to be used by the UE in the E-UTRA cell group (see TS 36.104 [33]). This field is used in (NG)EN-DC and NE-DC. |
| ***p-maxNR-FR1***Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]) the UE can use in NR SCG. |
| ***p-maxUE-FR1***Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1). |
| ***p-maxNR-FR1-MCG****Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]) the UE can use in NR MCG. This field is only used in NR-DC.* |
| ***p-maxNR-FR2-SCG****Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR SCG.*  |
| ***p-maxUE-FR2****Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 2 (FR2).*  |
| ***p-maxNR-FR2-MCG****Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR MCG.*  |
| ***pdcch-BlindDetectionSCG***Indicates the maximum value of the reference number of cells for PDCCH blind detection allowed to be configured for the SCG. |
| ***ph-InfoMCG***Power headroom information in MCG that is needed in the reception of PHR MAC CE in SCG. |
| ***ph-SupplementaryUplink***Power headroom information for supplementary uplink. For UE in (NG)EN-DC, this field is absent. |
| ***ph-Type1or3***Type of power headroom for a serving cell in MCG (PCell and activated SCells). *type1* refers to type 1 power headroom, *type3* refers to type 3 power headroom. (See TS 38.321 [3]).  |
| ***ph-Uplink***Power headroom information for uplink. |
| ***powerCoordination-FR1***Indicates the maximum power that the UE can use in FR1. |
| ***powerCoordination-FR2***Indicates the maximum power that the UE can use in frequency range 2 (FR2). This field is only used in NR-DC. |
| ***scgFailureInfo***Contains SCG failure type and measurement results. In case the sender has no measurement results available, the sender may include one empty entry (i.e. without any optional fields present) in *measResultPerMOList*. This field is used in (NG)EN-DC and NR-DC. |
| ***scgFailureInfoEUTRA***Contains SCG failure type and measurement results of the EUTRA secondary cell group. This field is only used in NE-DC. |
| ***scg-RB-Config***Contains all of the fields in the IE RadioBearerConfig used in SCG, used to allow the target SN to use delta configuration to the UE, e.g. during SN change. The field is signalled upon change of SN. Otherwise, the field is absent. This field is also absent when master eNB uses full configuration option. |
| ***selectedBandEntriesMNList***A list of indices referring to the position of a band entry selected by the MN, in each band combination entry in *allowedBC-ListMRDC* IE. Each band entry in the subset is identified by its position in the bandlist of this *BandCombination*. This *selectedBandEntriesMNList* includes the same number of entries, and listed in the same order as in *allowedBC-ListMRDC*. The SN uses this information to determine which bands out of the NR band combinations in *allowedBC-ListMRDC* it can configure in SCG. This field is only used in NR-DC. |
| ***servCellIndexRangeSCG***Range of serving cell indices that SN is allowed to configure for SCG serving cells. |
| ***sftdFrequencyList-NR***Includes a list of SSB frequencies. Each entry identifies the SSB frequency of a PSCell, which corresponds to one *MeasResultCellSFTD-NR* entry in the *MeasResultCellListSFTD-NR*. |
| ***sftdFrequencyList-EUTRA***Includes a list of E-UTRA frequencies. Each entry identifies the carrier frequency of a PSCell, which corresponds to one *MeasResultSFTD-EUTRA* entry in the *MeasResultCellListSFTD-EUTRA*. |
| ***sourceConfigSCG***Includes all of the current SCG configurations used by the target SN to build delta configuration to be sent to UE, e.g. during SN change. The field contains the *RRCReconfiguration* message, i.e. including *secondaryCellGroup* and *measConfig*. The field is signalled upon change of SN, unless MN uses full configuration option. Otherwise, the field is absent. |
| ***sourceConfigSCG-EUTRA***Includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration.* In this version of the specification, this field is absent when master gNB uses full configuration option. This field is only used in NE-DC. |
| ***ue-CapabilityInfo***Contains the IE *UE-CapabilityRAT-ContainerList* supported by the UE (see NOTE 3). A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information. |

|  |
| --- |
| *BandCombinationInfo* field descriptions |
| ***allowedFeatureSetsList***Defines a subset of the entries in a *FeatureSetCombination*. Each index identifies a position in the *FeatureSetCombination*, which corresponds to one *FeatureSetUplink*/*Downlink* for each band entry in the associated band combination. |
| ***bandCombinationIndex***The position of a band combination in the *supportedBandCombinationList* |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *SN-AddMod* | The field is mandatory present upon SN addition and SN change. It is optionally present upon SN modification and inter-MN handover without SN change. Otherwise, the field is absent. |

NOTE 3: The following table indicates per source RAT whether RAT capabilities are included or not in *ue-CapabilityInfo*.

|  |  |  |  |
| --- | --- | --- | --- |
| Source RAT | NR capabilities | E-UTRA capabilities | MR-DC capabilities |
| E-UTRA | Included | Not included | Included |

*END OF CHANGES*

START OF CHANGES

# B.1 Protection of RRC messages

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

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

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

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

NA… Message can never be sent after AS security activation

| Message | P | A-I | A-C | Comment |
| --- | --- | --- | --- | --- |
| *CounterCheck* | - | - | - |  |
| *CounterCheckResponse* | - | - | - |  |
| *DLInformationTransfer* | + | - | - |  |
| *DLInformationTransferMRDC* | - | - | - |  |
| *FailureInformation* | - | - | - |  |
| *LocationMeasurementIndication* | - | - | - |  |
| *MCGFailureInformation* | - | - | - |  |
| *MIB* | + | + | + |  |
| *MeasurementReport* | - | - | - | Measurement configuration may be sent prior to AS security activation. But: In order to protect privacy of UEs, *MeasurementReport* is only sent from the UE after successful AS security activation. |
| *MobilityFromNRCommand* | - | - | - |  |
| *Paging* | + | + | + |  |
| *RRCReconfiguration* | + | - | - | The message shall not be sent unprotected before AS security activation if it is used to perform handover or to establish SRB2 and DRBs. |
| *RRCReconfigurationComplete* | + | - | - | Unprotected, if sent as response to *RRCReconfiguration* which was sent before AS security activation. |
| *RRCReestablishment* | - | - | + | Integrity protection applied, but no ciphering. |
| *RRCReestablishmentComplete* | - | - | - |  |
| *RRCReestablishmentRequest* | - | - | + | This message is not protected by PDCP operation. However, a *shortMAC-I* is included. |
| *RRCReject* | + | + | + | Justification for A-I and A-C: the message can be sent in SRB0 in RRC\_INACTIVE state, after the AS security is activated. |
| *RRCRelease* | + | - | - | 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. *RRCRelease* message sent before AS security activation cannot include *deprioritisationReq, suspendConfig, redirectedCarrierInfo, cellReselectionPriorities* information fields. |
| *RRCResume* | - | - | - |  |
| *RRCResumeComplete* | - | - | - |  |
| *RRCResumeRequest* | - | - | + | This message is not protected by PDCP operation. However, a *resumeMAC-I* is included. |
| *RRCResumeRequest1* | - | - | + | This message is not protected by PDCP operation. However, a *resumeMAC-I* is included. |
| *RRCSetup* | + | + | + | Justification for A-I and A-C: the message can be sent in SRB0 in RRC\_INACTIVE state, after the AS security is activated. |
| *RRCSetupComplete* | + | NA | NA |  |
| *RRCSetupRequest* | + | NA | NA |  |
| *RRCSystemInfoRequest* | + | + | + | Justification for A-I and A-C: the message can be sent in SRB0 in RRC\_INACTIVE state, after the AS security is activated. |
| *SIB1* | + | + | + |  |
| *SCGFailureInformation* | - | - | - |  |
| *SCGFailureInformationEUTRA* | - | - | - |  |
| *SecurityModeCommand* | + | NA | NA | Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC). |
| *SecurityModeComplete* | - | - | + | The message is sent after AS security activation. Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure. |
| *SecurityModeFailure* | + | NA | NA | Neither integrity protection nor ciphering applied. |
| *SystemInformation* | + | + | + |  |
| *UEAssistanceInformation* | - | - | - |  |
| *UECapabilityEnquiry* | + | - | - | The network should retrieve UE capabilities only after AS security activation. |
| *UECapabilityInformation* | + | - | - |  |
| *UEInformationRequest* | - | - | - |  |
| *UEInformationResponse* | - | - | - | In order to protect privacy of UEs, *UEInformationResponse* is only sent from the UE after successful security activation |
| *ULInformationTransfer* | + | - | - |  |
| *ULInformationTransferMRDC* | - | - | - |  |

# 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

## RAN2#107bis

Agreements

1: There is a validity area, and the action when the UE exits the validity area is that the UE stops all early measurements.

2: Validity area is configured by means of dedicated RRC signaling

3: Validity area can be configured by means of: Lists of PCIs; Lists of CellIdentity;

4: When UE reselects to a cell that is not part of the validity area (for any of the configured frequencies/cells) while measIdleDuration is running, UE should stop measurement. UE stops the timer.

*WA that the UE also clears the entire early measurement configuration.*

Agreements

1: The RRC release message can include SSB measurement configuration. It is assumed that information provided for cell reselection by broadcast is not provided in the RRC release message.

2: No UE requirements will be specified for what UE shall do upon reselection to a cell broadcasting for some frequency an SSB measurement configuration that differs from the values received in the RRC release message i.e. UE may stop early performing measurements for concerned frequency

3: If the UE has not received a dedicated SSB configuration, the UE does early measurements based on SIB.

4: The UE only needs to support the following signalling combination options:

 A. If network uses broadcast signaling for the list of early measurements, it will provide all parameters by broadcast signaling with the only exception that dedicated signalling is used for the timer

 B. If network uses dedicated signaling for the list of early measurements, the following signalling options are allowed for each of the frequencies:

 1) SSB measurement configuration (incl SMTC) and all other parameters are provided by dedicated signaling

 2) SSB measurement configuration (incl SMTC) is broadcast and all other parameters are provided by dedicated signaling

Agreements

1: Based on RAN1/RAN4 reply LS, introduce ‘dormancy’ behaviour for NR SCell, i.e. the UE stops monitoring PDCCH on SCell but continue performing CSI measurements, AGC and beam management, if configured.

2: RAN2 confirms that UE “dormancy” operation is part of SCell activated state (i.e. not as part of SCell deactivated state)

Agreements

1: Direct SCell activation (setting the SCell state to activated or deactivated) in resume message is supported, if R4 can confirm that there are no blocking issues from their point of view

2: When the UE resumes to a cell included in the stored SCG, particular functionality for swapping of MCG and SCG configurations is not considered for Rel16

3: New conditions/triggers for resuming directly to the SN are not considered in Rel16.

4: R2 assumes the following (can be slightly modified due to progress on Scell dormancy):

 - The UE supports network-controlled suspension of the SCG in RRC\_CONNECTED.

 -UE behaviour for a suspended SCG is FFS

 -The UE supports at most one SCG configuration, suspended or not suspended, in Rel16.-

 -In RRC\_CONNECTED upon addition of the SCG, the SCG can be either suspended or not suspended by configuration.

Agreements

1: We don’t attempt this kind of enhancements (Common Cell Configuration for Signalling Reduction) in Rel-16 in WI CADC enh.

Agreements

1: Fast PCell recovery via SCell is not introduced in Rel-16

2: We add no functionality for optimized RRC re-establishment to SN RAT in Rel-16

3: No further mechanisms are introduced to resolve outstanding UL/DL RRC deadlock messages situation upon the triggering of MCG failure recovery

4: For MCG fast recovery via SRB3, the MCGFailureInformation message in UL is encapsulated in the ULInformationTransferMRDC message

5: A new RRC message, i.e., DLInformationTransferMRDC, is introduced in order to allow the SN to encapsulate (for SRB3) the MN response (i.e., RRCReconfiguration or RRCRelease message) to be send to the UE

6: The RRC procedure on these encapsulated messages are the same as if they had been received by SRB1

7: When receiving a MN RRCRelease message encapsulated within an SN RRC message via SRB3, the UE does not send any complete message

8: Split SRB1 is always used for the transmission of the MCGFailureInformation message. SRB3 is used only if split SRB1 is not configured

9: MCG failure recovery can be configured by the network.

## RAN2#108

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| --- |
| * Upon entering RRC CONNECTED mode, the UE stops validity timer T331 (if running) and deletes the dedicated idle mode measurement configuration (if configured).
* After moving to another RAT due to inter-RAT cell reselection, the UE stops validity timer T331 (if running) and deletes the dedicated idle mode measurement configuration (if configured)
* While transition from NR INACTIVE mode to NR IDLE mode, the UE keeps the validity timer T331 (if running) and the dedicated idle mode measurement configuration (if configured), i.e. just continue.
* While transition from LTE INACTIVE mode to LTE IDLE mode, the UE keeps the validity timer T331 (if running) and the dedicated idle mode measurement configuration (if configured), i.e. just continue.
* When UE reselects to a cell that is not part of the validity area, the UE stops the validity timer and also clears the entire early measurement configuration.
* For the early measurements during a 2-step resume:

if *RRCConnectionRelease* does not include idle/inactive measurement configuration, the UE keeps the configuration and T331 continues running (i.e. no action);if *RRCConnectionRelease* includes idle/inactive measurement configuration, the new configuration completely replaces the old configuration (incl timer which would be started).if *RRCConnectionRelease* includes an release indication, the UE releases the old configuration, stops timer.  |

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| * The validity area is defined as a carrier list (which could be different from the carriers to be measured during RRC\_IDLE/INACTIVE) with optional PCI list per carrier.
* The early measurement results are sorted by RSRP unless only RSRQ is configured as reporting quantity.
 |

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| * The validity area cannot include IRAT cells
* If, for a frequency for which SSB config was provided by broadcast @ initial configuration, reselected cell does not broadcast SSB config the UE is not required to measure concerned frequency while camping on concerned cell (but should re-attempt following another re-selection)
 |

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| * Measurement for Cell reselection (304) and early measurements are independent.
* In case UE cannot find suitable cell to camp or in anycell selection does not trigger stopping T331 or deleting early measurement configuration (no need to capture in the TS).
 |

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| --- |
| * The NR Rel-16 early measurement reporting solution is introduced in LTE
* a. The network can request (in RRCConnectionResume) the UE to send early measurements
* b. The UE can include early measurements in RRCConnectionResumeComplete.
* If a UE is released by an eNB which only configures bcast LTE early measurements and then reselects to an eNB which broadcasts both LTE and NR idle/inactive measurement configurations, the UE shall apply these NR configurations
* A new indication is introduced in SIB2 to indicate that the UE can perform NR early measurements while camped on the cell.
* At least one indication is introduced in RRCConnectionResume to indicate that the UE shall include the LTE and/or NR early measurements in RRCConnectionResumeComplete.
 |

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| --- |
| * We use BWP model as agreed/assumed in R1.
* R2 confirm that The dormant BWP is not configured with PDCCH monitoring, this is done by the IE pdcch-Config being absent in the BWP configuration.
* The dormant BWP is configured only when the SCell is configured with at least one other UE-specific RRC configured BWP (i.e., a ‘regular BWP’). There can be only one configured dormant BWP for an SCell.
* UE determines via RRC configuration, which DL BWP among the UE-specific RRC configured BWPs is the dormant BWP
* Upon entering dormancy, the UE clears/suspends any uplink grants (type 1 and type2) associated with the SCell.
* In dormancy SCell, the UE doesn’t perform RACH.
* In dormancy SCell, aperiodic CSI/SRS via self-carrier scheduling is not allowed.
* WA: If in dormancy SCell, aperiodic CSI via cross-carrier scheduling is not allowed, FFS for SRS
* As dormant state in LTE euCA, SCell dormancy is not applicable to the PUCCH SCell.
* Send LS to R1 cc R4 informing of agreements, stating that this is not finished and e.g. SRS transmissions on the dormancy SCell is still FFS (no action)
 |

|  |
| --- |
| * The guard timer for fast MCG link recovery should be configured via dedicated signalling, it is configured by the MN.
* The configuration of guard timer implicitly indicates that the feature of fast MCG link recovery is enabled by the network, and that the UE shall initiate the procedure.

General: * For fast MCG recovery, R2 assumes this is now finished (w.r.t functionality)
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| * Under async CA, clarify that the UE uses SFN of primary cell (i.e. PCell or PSCell) within the same cell group for the calculation of HARQ Process ID in SPS/CG, i.e. no change of rel-15 legacy UE behaviour.
* Under async CA, clarify that the UE uses SFN of primary cell (i.e. PCell or PSCell) within the same cell group for calculation of downlink/uplink assignment occurrences of SPS/CG, i.e. no change of rel-15 legacy UE behaviour.
* Under async CA, clarify that the UE uses SFN of primary cell (i.e. PCell or PSCell) within the same cell group for DRX on-duration determination, i.e. no change of rel-15 legacy UE behaviour.
* R2 assumes that SFN from Pcell is used for SI reception, thus no impact to SI reception
* R2 assumes that SFN from Pcell is used for Rel-15 DRX, thus no impact to Rel-15 DRX.
* R2 assumes that SFN from Pcell is used for UP operation (CG, DRX etc), thus no impact to UP.
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## RAN2#109-e

**Early measurements:**

* The UE starts to perform early measurements only when it is configured with measIdleDuration in RRC(Connection)Release (i.e. early measurement cannot be started only based on SIB signalling).
* RAN2 to confirm that the different ways of configuring early measurements are: *All configuration received in dedicated signalling (i.e. RRC(Connection)Release; or All configuration received in broadcast (except for the measIdleDuration); or The dedicated signalling contains measIdleDuration and the list of the EUTRA/NR carriers:*

***- For E-UTRA carriers, the measurement configuration is contained via the dedicated signaling***

 ***- For each of the NR carriers, the SSB configuration can be configured either via dedicated signalling or via SIB.***

* RAN2 to confirm that the NR/EUTRA carrier list can not be split into SIB and dedicated signalling (i.e. either both in SIB or both in dedicated).
* The measIdleDuration range in LTE euCA to be adopted in NR (i.e. ENUMERATED {sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare})
* As in LTE euCA, the RSRQ-Range-r13 IE (i.e. -30..46) will be used for specifying the thresholds for early measurement reporting of E-UTRA carriers in NR.
* The SCS IE to be on the top level of the MeasIdleCarrierNR (i.e. not within the ssb-MeasConfig IE).
* Capture the “available” aspect in procedure text.
* Clarification to be added in 36.331 that the UE will be configured with only one validity area (either the rel-15 or rel-16 version).
* In LTE/NR rel-16, the UE performs measurement on a carrier only if it is capable of CA or DC between the concerned carrier and the serving carrier.
* No special handling will be specified for the case of 2-step resume without context fetch (i.e. can be handled via network implementation).
* RNA update is not triggered due to going out of the validity area.
* For early measurements while camping in LTE, the UE is required to measure E-UTRA if idleModeMeasurements-r15 is included. The UE is required to measure NR carriers, if idleModeMeasurements-r16 is included IEs, in SIB2 respectively.
* In NR rel-16, the idleModeMeasurements can be used to specify whether the UE is required to perform early measurements on EUTRA, NR or both carriers. FFS if one IE (i.e. ENUMERATED {eutra, nr, both} or separate IEs (i.e. one for EUTRA, one for NR) is to be used.
* The frequencyBandList to be on the top level of MeasIdleCarrierNR. FFS regarding nrofSS-BlocksToAverage-r16 and absThreshSS-BlocksConsolidation-r16 IEs.
* No additional information elements regarding dedicated SSB configuration validity will be specified.
* In rel-16, SFTD measurements cannot be configured as part of early measurement configuration.
* No special handling of early measurement results during inter-RAT cell reselection will be specified.
* The early measurement configuration will not be enhanced to support per (serving)-frequency early measurement target frequency list.
* A NOTE to be added in 36/38.331 that UE is not required to perform early measurements on a given frequency if it finds mismatch between dedicated and SIB SSB configuration.