**E-meeting, 17– 29 August 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.331** | **CR** | **3427** | **rev** | **1** | **Current version:** | **17.1.0** |  |
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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:*** | RRC corrections for sidelink relay | | | | | | | | | | |
|  |  | | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| ***Work item code:*** |  | | | | | |  | ***Date:*** | | | 2022-08-17 |
|  |  | | | | |  | |  | | |  |
| ***Category:*** | ***F*** | |  | | | | | ***Release:*** | | | *Rel-17* |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | | |
| ***Reason for change:*** | | The current description is not clear from the following aspects:  [To be updated]  1. In clause 3.1, the defination of sidelink communication is not completely correct, and the defination of sidelink discovery is missing;  2. In clause 3.2, the abbreviation of SD-RSRP is missing;  3. In clause 5.3.3.3, there are redundant words of “. If the” in NOTE 2;  4. In clause 5.3.5.2, the description that all the Relay RLC channel can only be established after AS activation is unclear, since SL-RLC0 and SL-RLC1 for both of L2 U2N Relay UE and Remote UE are established before RRC connection establishment;  5. In clause 5.3.5.3, the condition of successful RACH at targe side as indicated in “and when MAC of an NR cell group successfully completes a Random Access procedure triggered above” was demoted to level-2 step, which can be misunderstood as the following level-2 steps should be excuted without successful RACH, which is not the intention;  6. In clause 5.8.13.3, there are redundant words of “or” and “or sl-TxPoolSelectedNormal”;  7. In clause 5.8.15.1, it is unclear if a L2 U2N Remote UE can consider itself camps on a cell different from the Relay UE’s PCell/camping cell;  8. In clause 6.3.2, the current present condition of *physCellId* in *ServingCellConfigCommon* includes PCell change, which does not explicitly cover path switch procedures;  9. In clause 6.3.5, the current description says *SL-ServingCellInfo* is used to indicate Remote UE’s serving cell, but it is derived from SIB1 received by Relay UE from its serving cell;  10. In clause 6.4, the current value of maxNrofSearchSpaceGroups-1-r17 is ffsUpperLimit. | | | | | | | | | |
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| ***Summary of change:*** | | [To be updated]  1. In clause 3.1, update the defination of sidelink communication, and add the defination of sidelink discovery;  2. In clause 3.2, add the abbreviation of SD-RSRP;  3. In clause 5.3.3.3, remove the redundant words of “. If the” from NOTE 2;  4. In clause 5.3.5.2, clarify that SL-RLC0 and SL-RLC1 are allowed to be established before AS activation for both of L2 U2N Relay UE and Remote UE, as they are established before RRC connection establishment;  5. In clause 5.3.5.3, promote “and when MAC of an NR cell group successfully completes a Random Access procedure triggered above” back to level-1 step, which is a condition to the following level-2 steps, and make “if *sl-PathSwitchConfig* was included in *reconfigurationWithSync*” and “successfully sending *RRCReconfigurationComplete* message” be a parallel level-1 step which can also be the condition of the following level-2 steps;  6. In clause 5.8.13.3, remove the redundant words of “or” and “or sl-TxPoolSelectedNormal”;  7. In clause 5.8.15.1, add a NOTE to clarify when a L2 U2N Remote UE already has a connected L2 U2N Relay UE, Remote UE should consider the camping cell as the same one indicated by Relay UE’s discovery message;  8. In clause 6.3.2, clarify the field of *physCellId* included in *ServingCellConfigCommon* should be present in path switch procedures;  9. In clause 6.3.5, clarify *SL-ServingCellInfo* is used to indicate Relay UE itself PCell/camping cell, which is also considered as Remote UE’s PCell/camping cell;  10. In clause 6.4, update the value of maxNrofSearchSpaceGroups-1-r17 to be 32, which is the same number with maximum destination of communication and discovery.  **Impact analysis**  Impacted 5G architecture options:  NR SA  Impacted functionality  Sidelink discovery, U2N SL relay  Inter-operability:  [To be updated]  The 1st change, 2nd change, 3rd change, 4th change, 6th change, 7th change, 8th change, 9th change are editorial, there are no inter-operablity issue;  The 5th change seems to change the legacy UE behaviour during HO, but it was a mistake when adding new Rel-17 behavour on top of legacy UE behaviour, and reasonable UE implementation should understand there suppose no change of legacy UE behaviour. In this case, correcting the mistake should have no inter-operability issue.  The 10th change is updating the maximum number of remote UE supported by a relay UE. If the network does not implement the change, it will not configure more than 32 Remote UEs to a Relay UE, because one UE can only support up to 32 unicast links. Therefore, no inter-operability issue. | | | | | | | | | |
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| ***Consequences if not approved:*** | | Without the above changes, the SL Relay related operations are not completely clear and might be misundertood. | | | | | | | | | |
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| ***Clauses affected:*** | | [To be updated]  3.1, 3.2, 5.3.3.3, 5.3.5.2, 5.3.5.3, 5.8.13.3, 5.8.15.2, 5.8.15.1, 6.3.2, 6.3.5, 6.4 | | | | | | | | | |
|  | |  | | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | | |

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| START OF CHANGES |

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**AM MRB:** An MRB associated with at least an AM RLC bearer for PTP transmission.

**BH RLC channel:** An RLC channel between two nodes, which is used to transport backhaul packets.

**Broadcast MRB:** A radio bearer configured for MBS broadcast delivery.

**CEIL:** Mathematical function used to 'round up' i.e. to the nearest integer having a higher or equal value.

**DAPS bearer:** a bearer whose radio protocols are located in both the source gNB and the target gNB during DAPS handover to use both source gNB and target gNB resources.

**Dedicated signalling:** Signalling sent on DCCH logical channel between the network and a single UE.

**Dormant BWP:** The dormant BWP is one of downlink BWPs configured by the network via dedicated RRC signalling. In the dormant BWP, the UE stops monitoring PDCCH on/for the SCell, but continues performing CSI measurements, Automatic Gain Control (AGC) and beam management, if configured. For each serving cell other than the SpCell or PUCCH SCell, the network may configure one BWP as a dormant BWP.

**Field:** The individual contents of an information element are referred to as fields.

**FLOOR:** Mathematical function used to 'round down' i.e. to the nearest integer having a lower or equal value.

**Global cell identity:** An identity to uniquely identifying an NR cell. It is consisted of *cellIdentity* and *plmn-Identity* of the first *PLMN-Identity* in *plmn-IdentityList* in SIB1.

**Information element:** A structural element containing single or multiple fields is referred as information element.

**MBS Radio Bearer:** A radio bearer that is configured for MBS delivery.

**Multicast/Broadcast Service:** A point-to-multipoint service as defined in TS 23.247 [67].

**Multicast MRB:** A radio bearer configured for MBS multicast delivery.

**MUSIM gap:** Period that the UE may use to perform MUSIM operations.

**NCSG:** Network controlled small gap as defined in TS 38.133 [14].

**NPN-only Cell**: A cell that is only available for normal service for NPNs' subscriber. An NPN-capable UE determines that a cell is NPN-only Cell by detecting that the *cellReservedForOtherUse* IE is set to true while the *npn-IdentityInfoList* IE is present in *CellAccessRelatedInfo*.

**NR sidelink communication**: AS functionality enabling at least V2X Communication as defined in TS 23.287 [55], and 5G ProSe Direct Communication and ProSe UE-to-Network Relay communication for Proximity based Services as defined in TS 23.304 [65] between two or more nearby UEs, using NR technology but not traversing any network node.

**NR sidelink discovery**: AS functionality enabling 5G ProSe Direct Discovery and ProSe UE-to-Network Relay discovery for Proximity based Services as defined in TS 23.304 [65] between two or more nearby UEs, using NR technology but not traversing any network node.

**PNI-NPN identity:** an identifier of a PNI-NPN comprising of a PLMN ID and a CAG -ID combination.

**Primary Cell**: The MCG cell, operating on the primary frequency, in which the UE either performs the initial connection establishment procedure or initiates the connection re-establishment procedure.

**PC5 Relay RLC channel**: An RLC channel between L2 U2N Remote UE and L2 U2N Relay UE, which is used to transport packets over PC5 for L2 UE-to-Network relay.

**Primary SCG Cell**: For dual connectivity operation, the SCG cell in which the UE performs random access when performing the Reconfiguration with Sync procedure.

**Primary Timing Advance Group**: Timing Advance Group containing the SpCell.

**PUCCH SCell:** An SCell configured with PUCCH.

**PUSCH-Less SCell:** An SCell configured without PUSCH.

**RedCap UE:** A UE with reduced capabilities as specified in clause 4.2.21.1 in TS 38.306 [26].

**RLC bearer configuration:** The lower layer part of the radio bearer configuration comprising the RLC and logical channel configurations.

**Secondary Cell**: For a UE configured with CA, a cell providing additional radio resources on top of Special Cell.

**Secondary Cell Group**: For a UE configured with dual connectivity, the subset of serving cells comprising of the PSCell and zero or more secondary cells.

**Serving Cell**: For a UE in RRC\_CONNECTED not configured with CA/DC there is only one serving cell comprising of the primary cell. For a UE in RRC\_CONNECTED configured with CA/ DC the term 'serving cells' is used to denote the set of cells comprising of the Special Cell(s) and all secondary cells.

**Small Data Transmission**: A procedure used for transmission of data and/or signalling over allowed radio bearers in RRC\_INACTIVE state (i.e. without the UE transitioning to RRC\_CONNECTED state).

**SNPN identity:** an identifier of an SNPN comprising of a PLMN ID and an NID combination.

**Special Cell:** For Dual Connectivity operation the term Special Cell refers to the PCell of the MCG or the PSCell of the SCG, otherwise the term Special Cell refers to the PCell.

**Split SRB**: In MR-DC, an SRB that supports transmission via MCG and SCG as well as duplication of RRC PDUs as defined in TS 37.340 [41].

**SSB Frequency**: Frequency referring to the position of resource element RE=#0 (subcarrier #0) of resource block RB#10 of the SS block.

**U2N Relay UE**: A UE that provides functionality to support connectivity to the network for U2N Remote UE(s).

**U2N Remote UE**: A UE that communicates with the network via a U2N Relay UE.

**Uu Relay RLC channel**: An RLC channel between L2 U2N Relay UE and gNB, which is used to transport packets over Uu for L2 UE-to-Network relay**.**

**UE Inactive AS Context**: UE Inactive AS Context is stored when the connection is suspended and restored when the connection is resumed. It includes information as defined in clause 5.3.8.3.

**V2X sidelink communication**: AS functionality enabling V2X Communication as defined in TS 23.285 [56], between nearby UEs, using E-UTRA technology but not traversing any network node.

## 3.2 Abbreviations

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

5GC 5G Core Network

ACK Acknowledgement

AM Acknowledged Mode

ARQ Automatic Repeat Request

AS Access Stratum

ASN.1 Abstract Syntax Notation One

BAP Backhaul Adaptation Protocol

BCD Binary Coded Decimal

BFD Beam Failure Detection

BH Backhaul

BLER Block Error Rate

BWP Bandwidth Part

CA Carrier Aggregation

CAG Closed Access Group

CAG-ID Closed Access Group Identifier

CAPC Channel Access Priority Class

CBR Channel Busy Ratio

CCCH Common Control Channel

CFR Common Frequency Resources

CG Cell Group

CHO Conditional Handover

CLI Cross Link Interference

CMAS Commercial Mobile Alert Service

CP Control Plane

CPA Conditional PSCell Addition

CPC Conditional PSCell Change

C-RNTI Cell RNTI

CSI Channel State Information

DAPS Dual Active Protocol Stack

DC Dual Connectivity

DCCH Dedicated Control Channel

DCI Downlink Control Information

DCP DCI with CRC scrambled by PS-RNTI

DFN Direct Frame Number

DL Downlink

DL-PRS Downlink Positioning Reference Signal

DL-SCH Downlink Shared Channel

DM-RS Demodulation Reference Signal

DRB (user) Data Radio Bearer

DRX Discontinuous Reception

DTCH Dedicated Traffic Channel

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

EPC Evolved Packet Core

EPS Evolved Packet System

ETWS Earthquake and Tsunami Warning System

E-UTRA Evolved Universal Terrestrial Radio Access

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

E-UTRA/EPC E-UTRA connected to EPC

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDD Frequency Division Duplex

FFS For Further Study

G-CS-RNTI Group Configured Scheduling RNTI

GERAN GSM/EDGE Radio Access Network

GIN Group ID for Network selection

GNSS Global Navigation Satellite System

G-RNTI Group RNTI

GSM Global System for Mobile Communications

HARQ Hybrid Automatic Repeat Request

HRNN Human Readable Network Name

HSDN High Speed Dedicated Network

H-SFN Hyper SFN

IAB Integrated Access and Backhaul

IAB-DU IAB-node DU

IAB-MT IAB Mobile Termination

IDC In-Device Coexistence

IE Information element

IMSI International Mobile Subscriber Identity

kB Kilobyte (1000 bytes)

L1 Layer 1

L2 Layer 2

L3 Layer 3

LBT Listen Before Talk

MAC Medium Access Control

MBS Multicast/Broadcast Service

MBS FSAI MBS Frequency Selection Area Identity

MCCH MBS Control Channel

MCG Master Cell Group

MDT Minimization of Drive Tests

MIB Master Information Block

MPE Maximum Permissible Exposure

MRB MBS Radio Bearer

MR-DC Multi-Radio Dual Connectivity

MTCH MBS Traffic Channel

MTSI Multimedia Telephony Service for IMS

MUSIM Multi-Universal Subscriber Identity Module

N/A Not Applicable

NE-DC NR E-UTRA Dual Connectivity

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

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

NID Network Identifier

NPN Non-Public Network

NR-DC NR-NR Dual Connectivity

NR/5GC NR connected to 5GC

NSAG Network Slice AS Group

NTN Non-Terrestrial Network

PCell Primary Cell

PDCP Packet Data Convergence Protocol

PDU Protocol Data Unit

PEI Paging Early Indication

PEI-O Paging Early Indication-Occasion

PLMN Public Land Mobile Network

PNI-NPN Public Network Integrated Non-Public Network

posSIB Positioning SIB

PPW PRS Processing Window

PRS Positioning Reference Signal

PSCell Primary SCG Cell

PTM Point to Multipoint

PTP Point to Point

PWS Public Warning System

QoE Quality of Experience

QoS Quality of Service

RAN Radio Access Network

RAT Radio Access Technology

RLC Radio Link Control

RLM Radio Link Monitoring

RMTC RSSI Measurement Timing Configuration

RNA RAN-based Notification Area

RNTI Radio Network Temporary Identifier

ROHC Robust Header Compression

RPLMN Registered Public Land Mobile Network

RRC Radio Resource Control

RS Reference Signal

SBAS Satellite Based Augmentation System

SCell Secondary Cell

SCG Secondary Cell Group

SCS Subcarrier Spacing

SD-RSRP Sidelink Discovery RSRP

SDT Small Data Transmission

SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information

SIB System Information Block

SL Sidelink

SLSS Sidelink Synchronisation Signal

SNPN Stand-alone Non-Public Network

SpCell Special Cell

SRAP Sidelink Relay Adaptation Protocol

SRB Signalling Radio Bearer

SRS Sounding Reference Signal

SSB Synchronization Signal Block

TAG Timing Advance Group

TDD Time Division Duplex

TEG Timing Error Group

TM Transparent Mode

TMGI Temporary Mobile Group Identity

U2N UE-to-Network

UDC Uplink Data Compression

UE User Equipment

UL Uplink

UM Unacknowledged Mode

UP User Plane

VR Virtual Reality

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

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| NEXT CHANGE |

## 5.2 System information

### 5.2.1 Introduction

System Information (SI) is divided into the *MIB* and a number of SIBs and posSIBs where:

- the *MIB* is always transmitted on the BCH with a periodicity of 80 ms and repetitions made within 80 ms (TS 38.212 [17], clause 7.1) and it includes parameters that are needed to acquire *SIB1* from the cell. The first transmission of the *MIB* is scheduled in subframes as defined in TS 38.213 [13], clause 4.1 and repetitions are scheduled according to the period of SSB;

- the *SIB1* is transmitted on the DL-SCH with a periodicity of 160 ms and variable transmission repetition periodicity within 160 ms as specified in TS 38.213 [13], clause 13. The default transmission repetition periodicity of *SIB1* is 20 ms but the actual transmission repetition periodicity is up to network implementation. For SSB and CORESET multiplexing pattern 1, *SIB1* repetition transmission period is 20 ms. For SSB and CORESET multiplexing pattern 2/3, *SIB1* transmission repetition period is the same as the SSB period (TS 38.213 [13], clause 13). *SIB1* includes information regarding the availability and scheduling (e.g. mapping of SIBs to SI message, periodicity, SI-window size) of other SIBs with an indication whether one or more SIBs are only provided on-demand and, in that case, the configuration needed by the UE to perform the SI request. *SIB1* is cell-specific SIB;

- SIBs other than *SIB1* and posSIBs are carried in *SystemInformation* (SI) messages, which are transmitted on the DL-SCH. Only SIBs or posSIBs having the same periodicity can be mapped to the same SI message. SIBs and posSIBs are mapped to the different SI messages. Each SI message is transmitted within periodically occurring time domain windows (referred to as SI-windows with same length for all SI messages). Each SI message is associated with an SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI message is transmitted. An SI message may be transmitted a number of times within the SI-window. Any SIB or posSIB except *SIB1* can be configured to be cell specific or area specific, using an indication in *SIB1*. The cell specific SIB is applicable only within a cell that provides the SIB while the area specific SIB is applicable within an area referred to as SI area, which consists of one or several cells and is identified by s*ystemInformationAreaID*;

- The mapping of SIBs to SI messages is configured in *schedulingInfoList* and *schedulingInfoList2*, while the mapping of posSIBs to SI messages is configured in *posSchedulingInfoList* and *schedulingInfoList2.* SIBs and posSIBs are mapped to separate SI messages even when configured using a common *schedulingInfoList2*. Each SIB is contained only in a single SI message. In the case of posSIB, a posSIB carrying GNSS Generic Assistance Data for different GNSS/SBAS [49] is contained in different SI messages. Each SIB and posSIB, including a posSIB carrying GNSS Generic Assistance Data for one GNSS/SBAS, is contained at most once in that SI message;

- For a UE in RRC\_CONNECTED, the network can provide system information through dedicated signalling using the *RRCReconfiguration* message, e.g. if the UE has an active BWP with no common search space configured to monitor system information, paging, or upon request from the UE.

- For PSCell and SCells, the network provides the required SI by dedicated signalling, i.e. within an *RRCReconfiguration* message. Nevertheless, the UE shall acquire *MIB* of the PSCell to get SFN timing of the SCG (which may be different from MCG). Upon change of relevant SI for SCell, the network releases and adds the concerned SCell. For PSCell, the required SI can only be changed with Reconfiguration with Sync.

NOTE: The physical layer imposes a limit to the maximum size a SIB can take. The maximum *SIB1* or *SI message* size is 2976 bits.

### 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, NAS- and positioning assistance data 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), *SIB11* (if the UE is configured for idle/inactive measurements), *SIB12* (if UE is capable of NR sidelink communication/discovery and is configured by upper layers to receive or transmit NR sidelink communication/discovery), and *SIB13*, *SIB14* (if UE is capable of V2X sidelink communication and is configured by upper layers to receive or transmit V2X sidelink communication), *SIB15* (if UE is configured by upper layers to report disaster roaming related information), *SIB16* (if the UE receives NSAG information for cell reselection from upper layer), *SIB19* (if UE is accessing NR via NTN access).

The UE capable of MBS broadcast which is receiving or interested to receive MBS broadcast service(s) via a broadcast MRB shall ensure having a valid version of *SIB20* and *SIB21*, regardless of the RRC state the UE is in.

The UE shall ensure having a valid version of the posSIB requested by upper layers.

#### 5.2.2.2 SIB validity and need to (re)-acquire SIB

##### 5.2.2.2.1 SIB validity

The UE shall apply the SI acquisition procedure as defined in clause 5.2.2.3 upon cell selection (e.g. upon power on), cell-reselection, return from out of coverage, after reconfiguration with sync completion, after entering the network from another RAT, upon receiving an indication that the system information has changed, upon receiving a PWS notification, upon receiving request (e.g., a positioning request) from upper layers; and whenever the UE does not have a valid version of a stored SIB or posSIB or a valid version of a requested SIB.

When the UE acquires a *MIB* or a *SIB1* or an SI message in a serving cell as described in clause 5.2.2.3, and if the UE stores the acquired SIB, then the UE shall store the associated *areaScope*, if present, the first *PLMN-Identity* in the *PLMN-IdentityInfoList* for non-NPN-only cells or the first NPN identity (SNPN identity in case of SNPN, or PNI-NPN identity in case of PNI-NPN) in the *NPN-IdentityInfoList* for NPN-only cells, the *cellIdentity*, the *systemInformationAreaID*, if present, and the *valueTag*, if present, as indicated in the *si-SchedulingInfo* for the SIB. If the UE stores the acquired posSIB, then the UE shall store the associated *areaScope*, if present, the *cellIdentity*, the *systemInformationAreaID*, if present, the *valueTag*, if provided in *assistanceDataSIB-Element*, and the *expirationTime* if provided in *assistanceDataSIB-Element*. The UE may use a valid stored version of the SI except *MIB*, *SIB1*, *SIB6*, *SIB7* or *SIB8* e.g. after cell re-selection, upon return from out of coverage or after the reception of SI change indication. The *valueTag* and *expirationTime* for posSIB is optionally provided in *assistanceDataSIB-Element*, as specified in TS 37.355 [49].

A L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE can inform the interested SIB(s) to the connected L2 U2N Relay UE as defined in clause 5.8.9.8.2 and receive the SIB(s) from the L2 U2N Relay UE as defined in clause 5.8.9.8.3. A L2 U2N Remote UE in RRC\_CONNECTED receives SIB1 and other SIB(s) in *RRCReconfiguration* message and performs on-demand SI request if required, as defined in clause 5.2.2.3.5 and 5.2.2.3.6. The L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE or RRC\_CONNECTED is not required to obtain SI over Uu interface, but it may decide to perform the SI acquisition procedure over Uu interface as defined in clause 5.2.2.3 by UE implementation.

NOTE: The storage and management of the stored SIBs in addition to the SIBs valid for the current serving cell is left to UE implementation.

The UE shall:

1> delete any stored version of a SIB after 3 hours from the moment it was successfully confirmed as valid;

1> for each stored version of a SIB:

2> if the *areaScope* is associated and its value for the stored version of the SIB is the same as the value received in the *si-SchedulingInfo* for that SIB from the serving cell:

3> if the UE is NPN capable and the cell is an NPN-only cell:

4> if the first NPN identity included in the *NPN-IdentityInfoList*, the *systemInformationAreaID* and the v*alueTag* that are included in the *si-SchedulingInfo* for the SIB received from the serving cell are identical to the NPN identity, the *systemInformationAreaID* and the *valueTag* associated with the stored version of that SIB:

5> consider the stored SIB as valid for the cell;

3> else if the first *PLMN-Identity* included in the *PLMN-IdentityInfoList*, the *systemInformationAreaID* and the v*alueTag* that are included in the *si-SchedulingInfo* for the SIB received from the serving cell are identical to the *PLMN-Identity*, the *systemInformationAreaID* and the *valueTag* associated with the stored version of that SIB:

4> consider the stored SIB as valid for the cell;

2> if the *areaScope* is not present for the stored version of the SIB and the *areaScope* value is not included in the *si-SchedulingInfo* for that SIB from the serving cell:

3> if the UE is NPN capable and the cell is an NPN-only cell:

4> if the first NPN identity in the *NPN-IdentityInfoList,* the *cellIdentity* and *valueTag* that are included in the *si-SchedulingInfo* for the SIB received from the serving cell are identical to the NPN identity*,* the *cellIdentity* and the *valueTag* associated with the stored version of that SIB:

5> consider the stored SIB as valid for the cell;

3> else if the first *PLMN-Identity* in the *PLMN-IdentityInfoList,* the *cellIdentity* and *valueTag* that are included in the *si-SchedulingInfo* for the SIB received from the serving cell are identical to the *PLMN-Identity,* the *cellIdentity* and the *valueTag* associated with the stored version of that SIB:

4> consider the stored SIB as valid for the cell;

1> for each stored version of a posSIB:

2> if the *areaScope* is associated and its value for the stored version of the posSIB is the same as the value received in the *posSIB-MappingInfo* for that posSIB from the serving cell and the *systemInformationAreaID* included in the *si-SchedulingInfo* is identical to the *systemInformationAreaID* associated with the stored version of that posSIB:

3> if the *valueTag* (see TS 37.355 [49]) for the posSIB received from the serving cell is identical to the *valueTag* associated with the stored version of that posSIB; or if the *expirationTime* (see TS 37.355 [49]) associated with the stored posSIB has not been expired:

4> consider the stored posSIB as valid for the cell;

2> if the *areaScope* is not present for the stored version of the posSIB and the *areaScope* value is not included in the *posSIB-MappingInfo* for that posSIB from the serving cell and the *cellIdentity* for the posSIB received from the serving cell is identical to the *cellIdentity* associated with the stored version of that posSIB:

3> if the *valueTag* (see TS 37.355 [49]) for the posSIB received from the serving cell is identical to the *valueTag* associated with the stored version of that posSIB; or if the *expirationTime* (see TS 37.355 [49]) associated with the stored posSIB has not been expired:

4> consider the stored posSIB as valid for the cell;

##### 5.2.2.2.2 SI change indication and PWS notification

A modification period is used, i.e. updated SI message (other than SI message for ETWS, CMAS, positioning assistance data, and some NTN-specific information as specified in the field descriptions ) is broadcasted in the modification period following the one where SI change indication is transmitted. The modification period boundaries are defined by SFN values for which SFN mod m = 0, where m is the number of radio frames comprising the modification period. The modification period is configured by system information. If H-SFN is provided in *SIB1*, and UE is configured with eDRX,modification period boundaries are defined by SFN values for which (H-SFN \* 1024 + SFN) mod *m* = 0.

For UEs in RRC\_IDLE or RRC\_INACTIVE configured to use an eDRX cycle longer than the modification period, an eDRX acquisition period is defined. The boundaries of the eDRX acquisition period are determined by H-SFN values for which H-SFN mod 1024 = 0.

The UE receives indications about SI modifications and/or PWS notifications using Short Message transmitted with P-RNTI over DCI (see clause 6.5). Repetitions of SI change indication may occur within preceding modification period or within preceding eDRX acquisition period. SI change indication is not applicable for SI messages containing posSIBs.

UEs in RRC\_IDLE or in RRC\_INACTIVE while T319a is not running shall monitor for SI change indication in own paging occasion every DRX cycle. UEs in RRC\_CONNECTED shall monitor for SI change indication in any paging occasion at least once per modification period if the UE is provided with common search space, including *pagingSearchSpace*, *searchSpaceSIB1* and *searchSpaceOtherSystemInformation*, on the active BWP to monitor paging, as specified in TS 38.213 [13], clause 13.

UEs in RRC\_INACTIVE while T319a is running shall monitor for SI change indication in any paging occasion at least once per modification period.

During a modification period where ETWS or CMAS transmission is started or stopped, the SI messages carrying the posSIBs scheduled in *posSchedulingInfoList* may change, so the UE might not be able to successfully receive those posSIBs in the remainder of the current modification period and next modification period according to the scheduling information received prior to the change.

ETWS or CMAS capable UEs in RRC\_IDLE or in RRC\_INACTIVE while T319a is not running shall monitor for indications about PWS notification in its own paging occasion every DRX cycle. ETWS or CMAS capable UEs in RRC\_CONNECTED shall monitor for indication about PWS notification in any paging occasion at least once every *defaultPagingCycle* if the UE is provided with common search space, including *pagingSearchSpace*, *searchSpaceSIB1* and *searchSpaceOtherSystemInformation,* on the active BWP to monitor paging.

ETWS or CMAS capable UEs in RRC\_INACTIVE while T319a is running shall monitor for indication about PWS notification in any paging occasion at least once every *defaultPagingCycle.*

For Short Message reception in a paging occasion, the UE monitors the PDCCH monitoring occasion(s) for paging as specified in TS 38.304 [20] and TS 38.213 [13].

A L2 U2N Remote UE is not required to monitor paging occasion for SI modifications and/or PWS notifications. It obtains the updated system information and SIB6/7/8 from the connected L2 U2N Relay UE as defined in clause 5.8.9.9.3.

If the UE receives a Short Message, the UE shall:

1> if the UE is ETWS capable or CMAS capable, the *etwsAndCmasIndication* bit of Short Message is set, and the UE is provided with *searchSpaceSIB1* and *searchSpaceOtherSystemInformation* on the active BWP or the initial BWP:

2> immediately re-acquire the *SIB1*;

2> if the UE is ETWS capable and *si-SchedulingInfo* includes scheduling information for *SIB6*:

3> acquire *SIB6*, as specified in clause 5.2.2.3.2,immediately;

2> if the UE is ETWS capable and *si-SchedulingInfo* includes scheduling information for *SIB7*:

3> acquire *SIB7*, as specified in clause 5.2.2.3.2,immediately;

2> if the UE is CMAS capable and *si-SchedulingInfo* includes scheduling information for *SIB8*:

3> acquire *SIB8*, as specified in clause 5.2.2.3.2,immediately;

NOTE: In case *SIB6*, *SIB7*, or *SIB8* overlap with a measurement gap it is left to UE implementation how to immediately acquire *SIB6*, *SIB7*, or *SIB8*.

1> if the UE is not configured with an eDRX cycle longer than the modification period and the *systemInfoModification* bit of Short Message is set:

2> apply the SI acquisition procedure as defined in clause 5.2.2.3 from the start of the next modification period;

1> if the UE is configured with an RRC\_IDLE eDRX cycle longer than the modification period and the *systemInfoModification-eDRX* bit of Short Message is set:

2> apply the SI acquisition procedure as defined in clause 5.2.2.3 from the start of the next eDRX acquisition period boundary.

#### 5.2.2.3 Acquisition of System Information

##### 5.2.2.3.1 Acquisition of *MIB* and *SIB1*

The UE shall:

1> apply the specified BCCH configuration defined in 9.1.1.1;

1> if the UE is in RRC\_IDLE or in RRC\_INACTIVE; or

1> if the UE is in RRC\_CONNECTED while T311 is running:

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

2> if the UE is unable to acquire the *MIB*;

3> perform the actions as specified in clause 5.2.2.5;

2> else:

3> perform the actions specified in clause 5.2.2.4.1.

1> if the UE is in RRC\_CONNECTED with an active BWP with common search space configured by *searchSpaceSIB1* and *pagingSearchSpace* and has received an indication about change of system information; or

1> if the UE is in RRC\_CONNECTED with an active BWP with common search space configured by *searchSpaceSIB1* and the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1, and, UE has not acquired SIB1 in current modification period; or

1> if the UE is in RRC\_CONNECTED with an active BWP with common search space configured by *searchSpaceSIB1*, and, the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1, and, *si-BroadcastStatus* for the required SIB(s) or *posSI-BroadcastStatus* for the required posSIB(s) is set to *notbroadcasting* in acquired *SIB1* in current modification period; or

1> if the UE is in RRC\_IDLE or in RRC\_INACTIVE; or

1> if the UE is in RRC\_CONNECTED while T311 is running:

2> if *ssb-SubcarrierOffset* indicates *SIB1* is transmitted in the cell (TS 38.213 [13]) and if *SIB1* acquisition is required for the UE:

3> acquire the *SIB1,* which is scheduled as specified in TS 38.213 [13];

3> if the UE is unable to acquire the *SIB1*:

4> perform the actions as specified in clause 5.2.2.5;

3> else:

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

2> else if *SIB1* acquisition is required for the UE and *ssb-SubcarrierOffset* indicates that *SIB1* is not scheduled in the cell:

3> perform the actions as specified in clause 5.2.2.5.

NOTE: The UE in RRC\_CONNECTED is only required to acquire broadcasted *SIB1* and MBS broadcast if the UE can acquire it without disrupting unicast or MBS multicast data reception, i.e., the broadcast and unicast/MBS multicast beams are quasi co-located. The UE in RRC\_INACTIVE state while *T319a* is running, is only required to acquire broadcasted *SIB1* and *MIB* if the UE can acquire them without disrupting unicast data reception, i.e. the broadcast and unicast beams are quasi co-located.

##### 5.2.2.3.2 Acquisition of an SI message

For SI message acquisition PDCCH monitoring occasion(s) are determined according to *searchSpaceOtherSystemInformation*. If *searchSpaceOtherSystemInformation* is set to zero, PDCCH monitoring occasions for SI message reception in SI-window are same as PDCCH monitoring occasions for *SIB1* where the mapping between PDCCH monitoring occasions and SSBs is specified in TS 38.213[13]. If *searchSpaceOtherSystemInformation* is not set to zero, PDCCH monitoring occasions for SI message are determined based on search space indicated by *searchSpaceOtherSystemInformation*. PDCCH monitoring occasions for SI message which are not overlapping with UL symbols (determined according to *tdd-UL-DL-ConfigurationCommon*) are sequentially numbered from one in the SI window. The [x×N+K]th PDCCH monitoring occasion (s) for SI message in SI-window corresponds to the Kth transmitted SSB, where x = 0, 1, ...X-1, K = 1, 2, …N, N is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is equal to CEIL(number of PDCCH monitoring occasions in SI-window/N). The actual transmitted SSBs are sequentially numbered from one in ascending order of their SSB indexes. The UE assumes that, in the SI window, PDCCH for an SI message is transmitted in at least one PDCCH monitoring occasion corresponding to each transmitted SSB and thus the selection of SSB for the reception SI messages is up to UE implementation.

When acquiring an SI message, the UE shall:

1> determine the start of the SI-window for the concerned SI message as follows:

2> if the concerned SI message is configured in the *schedulingInfoList*:

3> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the list of SI messages configured by *schedulingInfoList* in *si-SchedulingInfo* in *SIB1*;

3> determine the integer value *x = (n – 1) × w*, where *w* is the *si-WindowLength*;

3> the SI-window starts at the slot #*a*, where *a* = *x* mod N, in the radio frame for which SFN mod *T* = FLOOR(*x*/N), where *T* is the *si-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];

2> else if the concerned SI message is configured in the *schedulingInfoList2*;

3> determine the integer value *x = (si-WindowPosition -1) × w*, where *w* is the *si-WindowLength*;

3> the SI-window starts at the slot #*a*, where *a* = *x* mod N, in the radio frame for which SFN mod *T* = FLOOR(*x*/N), where *T* is the *si-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];

2> else if the concerned SI message is configured in the *posSchedulingInfoList* and *offsetToSI-Used* is not configured:

3> create a concatenated list of SI messages by appending the *posSchedulingInfoList* in *posSI-SchedulingInfo* in *SIB1* to *schedulingInfoList* in *si-SchedulingInfo* in *SIB1*;

3> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the concatenated list;

3> determine the integer value *x = (n – 1) × w*, where *w* is the *si-WindowLength*;

3> the SI-window starts at the slot #*a*, where *a* = *x* mod N, in the radio frame for which SFN mod *T* = FLOOR(*x*/N), where *T* is the *posSI-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];

2> else if the concerned SI message is configured by the *posSchedulingInfoList* and *offsetToSI-Used* is configured:

3> determine the number *m* which corresponds to the number of SI messages with an associated *si-Periodicity* of 8 radio frames (80 ms), configured by *schedulingInfoList* in *SIB1*;

3> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the list of SI messages configured by *posSchedulingInfoList* in *SIB1*;

3> determine the integer value *x* = *m* *× w +* (*n* – 1*)* *× w*, where *w* is the *si-WindowLength;*

3> the SI-window starts at the slot #*a*, where *a* = *x* mod N, in the radio frame for which SFN mod *T* = FLOOR(*x*/N) +8, where *T* is the *posSI-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];

1> receive the PDCCH containing the scheduling RNTI, i.e. SI-RNTI in the PDCCH monitoring occasion(s) for SI message acquisition, from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by *si-WindowLength*, or until the SI message was received;

1> if the SI message was not received by the end of the SI-window, repeat reception at the next SI-window occasion for the concerned SI message in the current modification period;

NOTE 1: The UE is only required to acquire broadcasted SI message if the UE can acquire it without disrupting unicast or MBS multicast data reception, i.e. the broadcast and unicast/MBS multicast beams are quasi co-located.

NOTE 2: The UE is not required to monitor PDCCH monitoring occasion(s) corresponding to each transmitted SSB in SI-window.

NOTE 3: If the concerned SI message was not received in the current modification period, handling of SI message acquisition is left to UE implementation.

NOTE 4: A UE in RRC\_CONNECTED may stop the PDCCH monitoring during the SI window for the concerned SI message when the requested SIB(s) are acquired.

NOTE 5: A UE capable of NR sidelink communication/discovery and configured by upper layers to perform NR sidelink communication/discovery on a frequency, may acquire *SIB12* or *SystemInformationBlockType28* from a cell other than current serving cell (for RRC\_INACTIVE or RRC\_IDLE) or current PCell (for RRC\_CONNECTED), if *SIB12* of current serving cell (for RRC\_INACTIVE or RRC\_IDLE) or current PCell (for RRC\_CONNECTED) does not provide configuration for NR sidelink communication/discovery for the frequency, and if the other cell providing configuration for NR sidelink communication/discovery for the frequency meets the S-criteria as defined in TS 38.304 [20] or TS 36.304 [27].

1> perform the actions for the acquired SI message as specified in clause 5.2.2.4.

##### 5.2.2.3.3 Request for on demand system information

The UE shall, while T319a is not running:

1> if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigSUL* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfigSUL* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfig-RedCap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfig-Redcap* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else:

2> if the UE is not a RedCap UE and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met; or

2> if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfig* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

3> if acknowledgement for SI request is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else:

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

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

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

3> apply the CCCH configuration as specified in 9.1.1.2;

3> initiate transmission of the *RRCSystemInfoRequest* message in accordance with 5.2.2.3.4;

3> if acknowledgement for *RRCSystemInfoRequest* message is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> if cell reselection occurs while waiting for the acknowledgment for SI request from lower layers:

2> reset MAC;

2> if SI request is based on *RRCSystemInfoRequest* message:

3> release RLC entity for SRB0.

NOTE: After RACH failure for SI request it is up to UE implementation when to retry the SI request.

##### 5.2.2.3.3a Request for on demand positioning system information

The UE shall, while T319a is not running:

1> if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfigSUL* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfigSUL* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfig-RedCap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfig-RedCap* corresponding to the SI message(s) that the UE upper layers require for positioning operations, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else:

2> if the UE is not a RedCap UE and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met; or

2> if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfig* corresponding to the SI message(s) that the UE upper layers require for positioning operations , and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;

3> if acknowledgement for SI request is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else:

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

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

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

3> apply the CCCH configuration as specified in 9.1.1.2;

3> initiate transmission of the *RRCSystemInfoRequest* message with *rrcPosSystemInfoRequest* in accordance with 5.2.2.3.4;

3> if acknowledgement for *RRCSystemInfoRequest* message with *rrcPosSystemInfoRequest* is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> if cell reselection occurs while waiting for the acknowledgment for SI request from lower layers:

2> reset MAC;

2> if SI request is based on *RRCSystemInfoRequest* message with *rrcPosSystemInfoRequest*:

3> release RLC entity for SRB0.

NOTE: After RACH failure for SI request it is up to UE implementation when to retry the SI request.

##### 5.2.2.3.4 Actions related to transmission of *RRCSystemInfoRequest* message

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

1> if the procedure is triggered to request the required SI message(s) other than positioning:

2> set the *requested-SI-List* to indicate the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

1> else if the procedure is triggered to request the required SI message(s) for positioning:

2> set the *requestedPosSI-List* to indicate the SI message(s) that the UE upper layers require for positioning operations, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*.

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

##### 5.2.2.3.5 Acquisition of SIB(s) or posSIB(s) in RRC\_CONNECTED

The UE shall:

1> if the UE is in RRC\_CONNECTED with an active BWP not configured with common search space with the field *searchSpaceOtherSystemInformation* and the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1, or

1> if the UE is in RRC\_CONNECTED and acting as a L2 U2N Remote UE and the UE has not stored a valid version of a SIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) in accordance with clause 5.2.2.1:

2> for the SI message(s) that, according to the *si-SchedulingInfo* or *posSI-SchedulingInfo* in the stored SIB1, contain at least one required SIB or requested posSIB:

3> if *onDemandSIB-Request* is configured and timer T350 is not running:

4> initiate transmission of the *DedicatedSIBRequest* message in accordance with 5.2.2.3.6;

4> start timer T350 with the timer value set to the *onDemandSIB-RequestProhibitTimer*;

1> else if the UE is in RRC\_CONNECTED with an active BWP configured with common search space with the field *searchSpaceOtherSystemInformation* and the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1:

2> for the SI message(s) that, according to the *si-SchedulingInfo* in the stored SIB1, contain at least one required SIB and for which *si-BroadcastStatus* is set to *broadcasting*:

3> acquire the SI message(s) as defined in clause 5.2.2.3.2;

2> for the SI message(s) that, according to the *si-SchedulingInfo* in the stored SIB1, contain at least one required SIB and for which *si-BroadcastStatus* is set to *notBroadcasting*:

3> if *onDemandSIB-Request* is configured and timer T350 is not running:

4> initiate transmission of the *DedicatedSIBRequest* message in accordance with 5.2.2.3.6;

4> start timer T350 with the timer value set to the *onDemandSIB-RequestProhibitTimer*;

4> acquire the requested SI message(s) corresponding to the requested SIB(s) as defined in clause 5.2.2.3.2.

2> for the SI message(s) that, according to the *posSI-SchedulingInfo* in the stored SIB1, contain at least one requested posSIB and for which *posSI-BroadcastStatus* is set to *broadcasting*:

3> acquire the SI message(s) as defined in clause 5.2.2.3.2;

2> for the SI message(s) that, according to the *posSI-SchedulingInfo* in the stored SIB1, contain at least one requested posSIB and for which *posSI-BroadcastStatus* is set to *notBroadcasting*:

3> if *onDemandSIB-Request* is configured and timer T350 is not running:

4> initiate transmission of the *DedicatedSIBRequest* message in accordance with 5.2.2.3.6;

4> start timer T350 with the timer value set to the *onDemandSIB-RequestProhibitTimer*;

4> acquire the requested SI message(s) corresponding to the requested posSIB(s) as defined in clause 5.2.2.3.2.

NOTE: UE may include on demand request for SIB and/or posSIB(s) in the same *DedicatedSIBRequest* message.

##### 5.2.2.3.6 Actions related to transmission of *DedicatedSIBRequest* message

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

1> if the procedure is triggered to request the required SIB(s):

2> include *requestedSIB-List* in the *onDemandSIB-RequestList* to indicate the requested SIB(s);

1> if the procedure is triggered to request the required posSIB(s):

2> include *requestedPosSIB-List* in the *onDemandSIB-RequestList* to indicate the requested posSIB(s).

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

#### 5.2.2.4 Actions upon receipt of System Information

##### 5.2.2.4.1 Actions upon reception of the *MIB*

Upon receiving the *MIB* the UE shall:

1> store the acquired *MIB*;

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

2> if the *cellBarred* in the acquired *MIB* is set to *barred*:

3> if the UE is a RedCap UE and *ssb-SubcarrierOffset* indicates *SIB1* is transmitted in the cell (TS 38.213 [13]):

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

3> consider the cell as barred in accordance with TS 38.304 [20];

3> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];

2> else:

3> apply the received *systemFrameNumber*, *pdcch-ConfigSIB1*, *subCarrierSpacingCommon*, *ssb-SubcarrierOffset* and *dmrs-TypeA-Position*.

##### 5.2.2.4.2 Actions upon reception of the *SIB1*

Upon receiving the *SIB1* the UE shall:

1> store the acquired *SIB1*;

1> if the UE is a RedCap UE and it is in RRC\_IDLE or in RRC\_INACTIVE, or if the RedCap UE is in RRC\_CONNECTED while *T311* is running:

2> if *intraFreqReselectionRedCap* is not present in *SIB1*:

3> consider the cell as barred in accordance with TS 38.304 [20];

3> perform barring as if *intraFreqReselectionRedCap* is set to allowed;

2> else:

3> if the *cellBarredRedCap1Rx* is present in the acquired *SIB1* and is set to *barred* and the UE is equipped with 1 Rx branch; or

3> if the *cellBarredRedCap2Rx* is present in the acquired *SIB1* and is set to *barred* and the UE is equipped with 2 Rx branches; or

3> if the *halfDuplexRedCapAllowed* is not present in the acquired *SIB1* and the UE supports only half-duplex FDD operation:

4> consider the cell as barred in accordance with TS 38.304 [20];

4> perform barring based on *intraFreqReselectionRedCap* as specified in TS 38.304 [20];

1> if the *cellAccessRelatedInfo* contains an entry of a selected SNPN or PLMN and in case of PLMN the UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:

2> in the remainder of the procedures use *npn-IdentityList, trackingAreaCode,* and *cellIdentity* for the cell as received in the corresponding entry of *npn-IdentityInfoList* containing the selected PLMN or SNPN;

1> else if the *cellAccessRelatedInfo* contains an entry with the *PLMN-Identity* of the selected PLMN:

2> in the remainder of the procedures use *plmn-IdentityList*, *trackingAreaCode*, *trackingAreaList,* and *cellIdentity* for the cell as received in the corresponding *PLMN-IdentityInfo* containing the selected PLMN;

1> if in RRC\_CONNECTED while T311 is not running:

2> disregard the *frequencyBandList*, if received, while in RRC\_CONNECTED;

2> forward the *cellIdentity* to upper layers;

2> forward the *trackingAreaCode* to upper layers, if not ignored;

2> forward the *trackingAreaList* to upper layers, if included;

2> forward the received *posSIB-MappingInfo* to upper layers, if included;

2> apply the configuration included in the *servingCellConfigCommon*;

2> if the UE has a stored valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, that the UE requires to operate within the cell in accordance with clause 5.2.2.1:

3> use the stored version of the required SIB or posSIB;

2> else:

3> acquire the required SIB or posSIB requested by upper layer as defined in clause 5.2.2.3.5;

NOTE: Void.

1> else:

2> if the UE supports one or more of the frequency bands indicated in the *frequencyBandList* for downlink for TDD, or one or more of the frequency bands indicated in the *frequencyBandList* for uplink for FDD, and they are not downlink only bands, and

2> if the UE is IAB-MT or supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* for a supported band in the downlink for TDD, or a supported band in uplink for FDD, and

2> if the UE supports an uplink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which

- is smaller than or equal to the *carrierBandwidth* (indicated in *uplinkConfigCommon* for the SCS of the initial uplink BWP or, for RedCap UE, of the initial uplink BWP for RedCap if configured), and which

- is wider than or equal to the bandwidth of the initial uplink BWP or, for RedCap UE, of the initial uplink BWP for RedCap if configured, and

2> if the UE supports a downlink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which

- is smaller than or equal to the *carrierBandwidth* (indicated in *downlinkConfigCommon* for the SCS of the initial downlink BWP or, for RedCap UE, of the initial downlink BWP for RedCap if configured), and which

- is wider than or equal to the bandwidth of the initial downlink BWP or, for RedCap UE, of the initial downlink BWP for RedCap if configured, and

2> if *frequencyShift7p5khz* is present and the UE supports corresponding 7.5kHz frequency shift on this band; or *frequencyShift7p5khz* is not present:

3> if *trackingAreaCode* or *trackingAreaList* is not provided for the selected PLMN nor the registered PLMN nor PLMN of the equivalent PLMN list:

4> consider the cell as barred in accordance with TS 38.304 [20];

4> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];

3> else if UE is IAB-MT and if *iab-Support* is not provided for the selected PLMN nor the registered PLMN nor PLMN of the equivalent PLMN list nor the selected SNPN nor the registered SNPN:

4> consider the cell as barred for IAB-MT in accordance with TS 38.304 [20];

3> else:

4> apply a supported uplink channel bandwidth with a maximum transmission bandwidth which

- is contained within the *carrierBandwidth* indicated in *uplinkConfigCommon* for the SCS of the initial uplink BWP or, for RedCap UEs, initial uplink BWP for RedCap, if configured, and which

- is wider than or equal to the bandwidth of the initial BWP for the uplink or, for a RedCap UE, of the initial uplink BWP for RedCap if configured;

4> apply a supported downlink channel bandwidth with a maximum transmission bandwidth which

- is contained within the *carrierBandwidth* indicated in *downlinkConfigCommon* for the SCS of the initial downlink BWP or, for RedCap UEs, initial downlink BWP for RedCap, if configured, and which

- is wider than or equal to the bandwidth of the initial BWP for the downlink or, for a RedCap UE, of the initial downlink BWP for RedCap if configured;

4> select the first frequency band in the *frequencyBandList*, for FDD from *frequencyBandList* for uplink, or for TDD from *frequencyBandList* for downlink,which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *nr-NS-PmaxList*, if present;

4> forward the *cellIdentity* to upper layers;

4> forward the *trackingAreaCode* to upper layers;

4> forward the *trackingAreaList* to upper layers, if included;

4> forward the received *posSIB-MappingInfo* to upper layers, if included;

4> forward the PLMN identity or SNPN identity or PNI-NPN identity to upper layers;

4> if in RRC\_INACTIVE and the forwarded information does not trigger message transmission by upper layers:

5> if the serving cell does not belong to the configured *ran-NotificationAreaInfo*:

6> initiate an RNA update as specified in 5.3.13.8;

4> forward the *ims-EmergencySupport* to upper layers, if present;

4> forward the *eCallOverIMS-Support* to upper layers, if present;

4> forward the *UAC-AccessCategory1-SelectionAssistanceInfo* or *UAC-AC1-SelectAssistInfo* for the selected PLMN/SNPNto upper layers, if present and set to *a*, *b* or *c*;

4> if the UE is in SNPN access mode:

5> forward the *imsEmergencySupportForSNPN* indicators with the corresponding SNPN identities to upper layers, if present;

4> apply the configuration included in the *servingCellConfigCommon*;

4> apply the specified PCCH configuration defined in 9.1.1.3;

4> if the UE has a stored valid version of a SIB, in accordance with clause 5.2.2.2.1, that the UE requires to operate within the cell in accordance with clause 5.2.2.1:

5> use the stored version of the required SIB;

4> if the UE has not stored a valid version of a SIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s), in accordance with clause 5.2.2.1:

5> for the SI message(s) that, according to the *si-SchedulingInfo*, contain at least one required SIB and for which *si-BroadcastStatus* is set to broadcasting:

6> acquire the SI message(s) as defined in clause 5.2.2.3.2;

5> for the SI message(s) that, according to the *si-SchedulingInfo*, contain at least one required SIB and for which *si-BroadcastStatus* is set to *notBroadcasting*:

6> trigger a request to acquire the SI message(s) as defined in clause 5.2.2.3.3;

4> if the UE has a stored valid version of a posSIB, in accordance with clause 5.2.2.2.1, of one or several required posSIB(s), in accordance with clause 5.2.2.1:

5> use the stored version of the required posSIB;

4> if the UE has not stored a valid version of a posSIB, in accordance with clause 5.2.2.2.1, of one or several posSIB(s) in accordance with clause 5.2.2.1:

5> for the SI message(s) that, according to the *posSI-SchedulingInfo*, contain at least one requested posSIB and for which *posSI-BroadcastStatus* is set to *broadcasting*:

6> acquire the SI message(s) as defined in clause 5.2.2.3.2;

5> for the SI message(s) that, according to the *posSI-SchedulingInfo*, contain at least one requested posSIB for which *posSI-BroadcastStatus* is set to *notBroadcasting*:

6> trigger a request to acquire the SI message(s) as defined in clause 5.2.2.3.3a;

4> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList* in *uplinkConfigCommon* for FDD or in *downlinkConfigCommon* for TDD;

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

5> apply the *additionalPmax* for UL;

4> else:

5> apply the *p-Max* in *uplinkConfigCommon* for UL;

4> if *supplementaryUplink* is present in *servingCellConfigCommon*; and

4> if the UE supports one or more of the frequency bands indicated in the *frequencyBandList* for the *supplementaryUplink*; and

4> if the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* for a supported supplementary uplink band; and

4> if the UE supports an uplink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which

- is smaller than or equal to the *carrierBandwidth* (indicated in *supplementaryUplink* for the SCS of the initial uplink BWP), and which

- is wider than or equal to the bandwidth of the initial uplink BWP of the SUL:

5> consider supplementary uplink as configured in the serving cell;

5> select the first frequency band in the *frequencyBandList* for the *supplementaryUplink* which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *nr-NS-PmaxList*, if present;

5> apply a supported supplementary uplink channel bandwidth with a maximum transmission bandwidth which

- is contained within the *carrierBandwidth* (indicated in *supplementaryUplink* for the SCS of the initial uplink BWP), and which

- is wider than or equal to the bandwidth of the initial BWP of the SUL;

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

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

6> apply the *additionalPmax* in *supplementaryUplink* for SUL;

5> else:

6> apply the *p-Max* in *supplementaryUplink* for SUL;

2> else:

3> consider the cell as barred in accordance with TS 38.304 [20]; and

3> perform barring as if *intraFreqReselection* is set to *notAllowed*;

##### 5.2.2.4.3 Actions upon reception of *SIB2*

Upon receiving *SIB2*, the UE shall:

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

2> if, for the entry in *frequencyBandList* with the same index as the frequency band selected in clause 5.2.2.4.2, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandList*:

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

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

4> apply the *additionalPmax*;

3> else:

4> apply the *p-Max*;

3> if the UE selects a frequency band (from the procedure in clause 5.2.2.4.2) for the supplementary uplink:

4> if, for the entry in *frequencyBandListSUL* with the same index as the frequency band selected in clause 5.2.2.4.2, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandListSUL*:

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

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*;

4> else:

5> apply the *p-Max.*

2> else:

3> apply the *p-Max*;

##### 5.2.2.4.4 Actions upon reception of *SIB3*

No UE requirements related to the contents of this *SIB3* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

##### 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> if the UE is not a RedCap UE; or

3> if the UE is a RedCap UE and the *interFreqCarrierFreqList-v1700* is absent; or

3> if the UE is a RedCap UE and *redCapAccessAllowed* is present in *interFreqCarrierFreqList-v1700*:

4> 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:

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

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

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

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*;

6> 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:

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

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

8> apply the *additionalPmax*;

7> else:

8> apply the *p-Max*;

6> else:

7> apply the *p-Max*;

5> else:

6> apply the *p-Max*;

1> if in RRC\_IDLE or RRC\_INACTIVE, and T331 is running:

2> perform the actions as specified in 5.7.8.1a;

##### 5.2.2.4.6 Actions upon reception of *SIB5*

No UE requirements related to the contents of this *SIB5* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

##### 5.2.2.4.7 Actions upon reception of *SIB6*

Upon receiving the *SIB6* the UE shall:

1> forward the received *warningType*, *messageIdentifier* and *serialNumber* to upper layers;

##### 5.2.2.4.8 Actions upon reception of *SIB7*

Upon receiving the *SIB7* the UE shall:

1> if there is no current value for *messageIdentifier* and *serialNumber* for *SIB7*; or

1> if either the received value of *messageIdentifier* or of s*erialNumber,* or of both *messageIdentifier* and s*erialNumber* are different from the current values of *messageIdentifier* and *serialNumber* for *SIB7*:

2> use the received values of *messageIdentifier* and *serialNumber* for *SIB7* as the current values of *messageIdentifier* and *serialNumber* for *SIB7*;

2> discard any previously buffered *warningMessageSegment*;

2> if all segments of a warning message have been received:

3> assemble the warning message from the received *warningMessageSegment(s)*;

3> forward the received warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;

3> stop reception of *SIB7*;

3> discard the current values of *messageIdentifier* and *serialNumber* for *SIB7*;

2> else:

3> store the received *warningMessageSegment*;

3> continue reception of *SIB7*;

1> else if all segments of a warning message have been received:

2> assemble the warning message from the received *warningMessageSegment(s)*;

2> forward the received complete warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;

2> stop reception of *SIB7*;

2> discard the current values of *messageIdentifier* and *serialNumber* for *SIB7*;

1> else:

2> store the received *warningMessageSegment*;

2> continue reception of *SIB7*;

The UE should discard any stored *warningMessageSegment* and the current value of *messageIdentifier* and *serialNumber* for *SIB7* if the complete warning message has not been assembled within a period of 3 hours.

##### 5.2.2.4.9 Actions upon reception of *SIB8*

Upon receiving the *SIB8* the UE shall:

1> if the *SIB8* contains a complete warning message and the complete geographical area coordinates (if any):

2> forward the received warning message, *messageIdentifier*, *serialNumber*, *dataCodingScheme* and the geographical area coordinates (if any) to upper layers;

2> continue reception of *SIB8*;

1> else:

2> if the received values of *messageIdentifier* and *serialNumber* are the same (each value is the same) as a pair for which a warning message and the geographical area coordinates (if any) are currently being assembled:

3> store the received *warningMessageSegment*;

3> store the received *warningAreaCoordinatesSegment* (if any);

3> if all segments of a warning message and geographical area coordinates (if any) have been received:

4> assemble the warning message from the received *warningMessageSegment*;

4> assemble the geographical area coordinates from the received *warningAreaCoordinatesSegment* (if any);

4> forward the received warning message, *messageIdentifier*, *serialNumber*, *dataCodingScheme* and geographical area coordinates (if any) to upper layers;

4> stop assembling a warning message and geographical area coordinates (if any) for this *messageIdentifier* and *serialNumber* and delete all stored information held for it;

3> continue reception of *SIB8*;

2> else if the received values of *messageIdentifier* and/or *serialNumber* are not the same as any of the pairs for which a warning message is currently being assembled:

3> start assembling a warning message for this *messageIdentifier* and *serialNumber* pair;

3> start assembling the geographical area coordinates (if any) for this *messageIdentifier* and *serialNumber* pair;

3> store the received *warningMessageSegment*;

3> store the received *warningAreaCoordinatesSegment* (if any);

3> continue reception of *SIB8*;

The UE should discard *warningMessageSegment* and *warningAreaCoordinatesSegment* (if any) and the associated values of *messageIdentifier* and *serialNumber* for *SIB8* if the complete warning message and the geographical area coordinates (if any) have not been assembled within a period of 3 hours.

NOTE: The number of warning messages that a UE can re-assemble simultaneously is a function of UE implementation.

##### 5.2.2.4.10 Actions upon reception of *SIB9*

Upon receiving *SIB9* with r*eferenceTimeInfo*, the UE may perform the related actions except for the action of ignoring all further *referenceTimeInfo* received in SIB9 as specified in clause 5.7.1.3.

##### 5.2.2.4.11 Actions upon reception of *SIB10*

Upon receiving *SIB10*, the UE shall:

1> Forward the *HRNN-list* entries with the corresponding PNI-NPN and SNPN identities to upper layers;

##### 5.2.2.4.12 Actions upon reception of *SIB11*

Upon receiving *SIB11*, the UE shall:

1> if in RRC\_IDLE or RRC\_INACTIVE, and T331 is running:

2> perform the actions as specified in 5.7.8.1a;

##### 5.2.2.4.13 Actions upon reception of *SIB12*

Upon receiving *SIB12*, the UE shall:

1> if the UE has stored at least one segment of *SIB12* and the value tag of *SIB12* has changed since a previous segment was stored:

2> discard all stored segments;

1> store the segment;

1> if all segments have been received:

2> assemble *SIB12-IEs* from the received segments;

2> if *sl-FreqInfoList* is included in *sl-ConfigCommonNR*:

3> if configured to receive NR sidelink communication:

4> use the resource pool(s) indicated by *sl-RxPool* for NR sidelink communication reception, as specified in 5.8.7;

3> if configured to transmit NR sidelink communication:

4> use the resource pool(s) indicated by *sl-TxPoolSelectedNormal*, or *sl-TxPoolExceptional* for NR sidelink communication transmission, as specified in 5.8.8;

4> perform CBR measurement on the transmission resource pool(s) indicated by *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for NR sidelink communication transmission, as specified in 5.5.3.1;

4> use the synchronization configuration parameters for NR sidelink communication on frequencies included in *sl-FreqInfoList*, as specified in 5.8.5;

3> if configured to receive NR sidelink discovery:

4> use the resource pool(s) indicated by *sl-DiscRxPool* or *sl-RxPool* for NR sidelink discovery reception, as specified in 5.8.13.2;

3> if configured to transmit NR sidelink discovery:

4> use the resource pool(s) indicated by *sl-DiscTxPoolSelected*, *sl-TxPoolExceptional* or *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission, as specified in 5.8.13.3;

4> perform CBR measurement on the transmission resource pool(s) indicated by *sl-TxPoolSelectedNormal*, *sl-DiscTxPoolSelected* or *sl-TxPoolExceptional* for NR sidelink discovery transmission, as specified in 5.5.3.1;

4> use the synchronization configuration parameters for NR sidelink discovery on frequencies included in *sl-FreqInfoList*, as specified in 5.8.5;

2> if *sl-RadioBearerConfigList* or *sl-RLC-BearerConfigList* is included in *sl-ConfigCommonNR*:

3> perform sidelink DRB addition/modification/release as specified in 5.8.9.1a.1/5.8.9.1a.2;

2> if *sl-MeasConfigCommon* is included in *sl-ConfigCommonNR*:

3> store the NR sidelink measurement configuration.

2> if *sl-DRX-ConfigCommonGC-BC* is included in *SIB12-IEs*:

3> store the NR sidelink DRX configuration and configure lower layers to perform sidelink DRX operation for groupcast and broadcast as specified in TS 38.321 [3].

1> if the UE is acting as L2 U2N Remote UE:

2> if the *ue-TimersAndConstantsRemoteUE* is included in *SIB12*:

3> use values for timers T300, T301 and T319 as included in the *ue-TimersAndConstantsRemoteUE* received in *SIB12*;

2> else:

3> use values for timers T300, T301 and T319 as included in the *ue-TimersAndConstants* received in *SIB1*;

The UE should discard any stored segments for *SIB12* if the complete *SIB12* has not been assembled within a period of 3 hours. The UE shall discard any stored segments for *SIB12* upon cell (re-)selection.

##### 5.2.2.4.14 Actions upon reception of *SIB13*

Upon receiving *SIB13*, the UE shall perform the actions upon reception of *SystemInformationBlockType21* as specified in 5.2.2.28 in TS 36.331 [10].

##### 5.2.2.4.15 Actions upon reception of *SIB14*

Upon receiving *SIB14*, the UE shall perform the actions upon reception of *SystemInformationBlockType26* as specified in 5.2.2.33 in TS 36.331 [10].

##### 5.2.2.4.16 Actions upon reception of *SIBpos*

No UE requirements related to the contents of the *SIBpos* apply other than those specified elsewhere e.g. within TS 37.355 [49], and/or within the corresponding field descriptions.

##### 5.2.2.4.17 Actions upon reception of *SIB15*

Upon receiving *SIB15*, the UE shall:

1> forward the applicable disaster roaming information for each PLMN sharing the cell to upper layers.

##### 5.2.2.4.18 Actions upon reception of *SIB16*

Upon receiving *SIB16* with cell reselection priorities for slicing, the UE shall perform the actions as specified in TS 38.304 [20].

##### 5.2.2.4.19 Actions upon reception of *SIB17*

Upon receiving *SIB17*, the UE shall:

1> if the UE has stored at least one segment of *SIB17* and the value tag of *SIB17* has changed since a previous segment was stored:

2> discard all stored segments;

1> store the segment;

1> if all segments have been received:

2> assemble *SIB17-IEs* from the received segments.

The UE should discard any stored segments for *SIB17* if the complete *SIB17* has not been assembled within a period of 3 hours. The UE shall discard any stored segments for *SIB17* upon cell (re-) selection.

##### 5.2.2.4.20 Actions upon reception of *SIB18*

Upon receiving *SIB18*, the UE shall:

1> forward the Group IDs for Network selection (GINs) in *SIB18* with the corresponding SNPN identities to upper layers;

##### 5.2.2.4.21 Actions upon reception of *SIB19*

Upon receiving *SIB19*, the UE shall:

1> start or restart T430 with the duration *ntn-UlSyncValidityDuration* from the subframe indicated by epochTime;

NOTE: UE should attempt to re-acquire *SIB19* before the end of the duration indicated by *ntn-UlSyncValidityDuration* and *epochTime* by UE implementation.

##### 5.2.2.4.22 Actions upon reception of *SIB20*

No UE requirements related to the contents of *SIB20* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/or within the corresponding field descriptions.

##### 5.2.2.4.23 Actions upon reception of *SIB21*

No UE requirements related to the contents of *SIB21* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/or within the corresponding field descriptions.

#### 5.2.2.5 Essential system information missing

The UE shall:

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

2> if the UE is unable to acquire the *MIB*:

3> consider the cell as barred in accordance with TS 38.304 [20];

3> perform barring as if *intraFreqReselection* is set to allowed;

2> else if the UE is unable to acquire the *SIB1*:

3> consider the cell as barred in accordance with TS 38.304 [20];

3> if the UE is a RedCap UE:

4> peform barring as if *intraFreqReselectionRedCap* is set to allowed;

3> else:

4> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20].

#### 5.2.2.6 T430 expiry

The UE shall:

1> if in RRC\_CONNECTED:

2> inform lower layers that UL synchronisation is lost;

2> acquire *SIB19* as defined in clause 5.2.2.3.2;

2> upon successful acquisition of *SIB19*:

3> inform lower layers that UL synchronisation is obtained;

|  |
| --- |
| NEXT CHANGE |

### 5.3.3 RRC connection establishment

#### 5.3.3.1 General



Figure 5.3.3.1-1: RRC connection establishment, successful



Figure 5.3.3.1-2: RRC connection establishment, network reject

The purpose of this procedure is to establish an RRC connection. RRC connection establishment involves SRB1 establishment. The procedure is also used to transfer the initial NAS dedicated information/ message from the UE to the network.

The network applies the procedure e.g.as follows:

- When establishing an RRC connection;

- When UE is resuming or re-establishing an RRC connection, and the network is not able to retrieve or verify the UE context. In this case, UE receives *RRCSetup* and responds with *RRCSetupComplete*.

#### 5.3.3.1a Conditions for establishing RRC Connection for NR sidelink communication/discovery/V2X sidelink communication

For NR sidelink communication/discovery, an RRC connection establishment is initiated only in the following cases:

1> if configured by upper layers to transmit NR sidelink communication/discovery and related data is available for transmission:

2> if the frequency on which the UE is configured to transmit NR sidelink communication is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-TxPoolSelectedNormal* for the concerned frequency; or

2> if the frequency on which the UE is configured to transmit NR sidelink discovery is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-DiscTxPoolSelected* or *sl-TxPoolSelectedNormal* for the concerned frequency;

For L2 U2N Relay UE in RRC\_IDLE, an RRC connection establishment is initiated in the following cases:

1> if any message is received from a L2 U2N Remote UE via SL-RLC0 as specified in 9.1.1.4 or SL-RLC1 as specified in 9.2.4;

For V2X sidelink communication, an RRC connection is initiated only when the conditions specified for V2X sidelink communication in clause 5.3.3.1a of TS 36.331 [10] are met.

NOTE: Upper layers initiate an RRC connection (except if the RRC connection is initiated at the L2 U2N Relay UE upon reception of a message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1). The interaction with NAS is left to UE implementation.

#### 5.3.3.2 Initiation

The UE initiates the procedure when upper layers request establishment of an RRC connection while the UE is in RRC\_IDLE and it has acquired essential system information, or for sidelink communication as specified in clause 5.3.3.1a.

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

2> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;

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

1> if the UE is acting as L2 U2N Remote UE:

2> apply the specified configuration of SL-RLC0 as specified in 9.1.1.4;

2> apply the SDAP configuration and PDCP configuration as specified in 9.1.1.2 for SRB0;

1> else:

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

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

2> apply the CCCH configuration as specified in 9.1.1.2;

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

1> start timer T300;

1> initiate transmission of the *RRCSetupRequest* message in accordance with 5.3.3.3;

#### 5.3.3.3 Actions related to transmission of *RRCSetupRequest* message

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

1> set the *ue-Identity* as follows:

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

3> set the *ue-Identity* to *ng-5G-S-TMSI-Part1*;

2> else:

3> draw a 39-bit random value in the range 0..239-1 and set the *ue-Identity* to this value;

NOTE 1: Upper layers provide the *5G-S-TMSI* if the UE is registered in the TA of the current cell.

1> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN):

2> set the *establishmentCause* to *mps-PriorityAccess*;

1> else:

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

NOTE 2: In case the L2 U2N Relay UE initiates RRC connection establishment triggered by reception of message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1 as specified in 5.3.3.1a, the L2 U2N Relay UE sets the *establishmentCause* by implementation, but it can only set the *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* as *establishmentCause* if the same cause value is in the message received from the L2 U2N Remote UE via SL-RLC0.

1> if *ta-Report* is configured with value *enabled* and the UE supports TA reporting;

2> indicate TA report initiation to lower layers;

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

If the UE is a RedCap UE and the initial DL BWP for RedCap is not associated with CD-SSB, the UE may continue cell re-selection related measurements as well as cell re-selection evaluation, otherwise the UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.6.

NOTE 3: For L2 U2N Remote UE in RRC\_IDLE, the cell (re)selection procedure as specified in TS 38.304 [20] and relay (re)selection procedure as specified in 5.8.15.3 are performed independently and up to UE implementation to select either a cell or a L2 U2N Relay UE.

#### 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> if *sdt-MAC-PHY-CG-Config* is configured:

3> instruct the MAC entity to stop the *cg-SDT-TimeAlignmentTimer*, if it is running;

3> instruct the MAC entity to start the *timeAlignmentTimer* associated with the PTAG*,* if it is not running;

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> discard any application layer measurement reports which were not transmitted yet;

2> inform upper layers about the release of all application layer measurement configurations;

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, T319 or T319a 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 5.7.8.3;

2> enter RRC\_CONNECTED;

2> stop the cell re-selection procedure;

2> stop relay (re)selection procedure if any for L2 U2N Remote UE;

1> consider the current cell to be the PCell;

1> perform the L2 U2N Remote UE configuration procedure in accordance with the received *sl-L2RemoteUE-Config* as specified in 5.3.5.16;

1> perform the sidelink dedicated configuration procedure in accordance with the received *sl-ConfigDedicatedNR* as specified in 5.3.5.14;

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

2> if *reconnectCellId* in *VarRLF-Report* is not set, and if the received *RRCSetup* is in response to an *RRCSetupRequest*:

3> if the UE supports RLF-Report for conditional handover and if *choCellId* in *VarRLF-Report* is set:

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

3> else:

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

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

1> if the UE supports RLF report for inter-RAT MRO NR as defined in TS 36.306 [62], and if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:

2> if *reconnectCellId* in *VarRLF-Report* of TS 36.331[10] is not set:

3> set *timeUntilReconnection* in *VarRLF-Report* of TS 36.331[10] to the time that elapsed since the last radio link failure or handover failure in LTE;

3> set *nrReconnectCellId* in *reconnectCellId* in *VarRLF-Report* of TS 36.331[10] to the global cell identity and the tracking area code of 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> if upper layers selected an SNPN or a PLMN and in case of PLMN UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:

3> set the *selectedPLMN-Identity* from the *npn-IdentityInfoList*;

2> else:

3> set the *selectedPLMN-Identity* to the PLMN selected by upper layers from the *plmn-IdentityInfoList*;

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> if upper layers provide onboarding request indication:

3> include the *onboardingRequest*;

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

2> if connecting as an IAB-node:

3> include the *iab-NodeIndication*;

2> if the SIB1 contains *idleModeMeasurementsNR* and the UE has NR idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*; or

2> if the SIB1 contains *idleModeMeasurementsEUTRA* and the UE has E-UTRA idle/inactive measurement information available in *VarMeasIdleReport*:

3> include the *idleMeasAvailable*;

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

3> include the *logMeasAvailable* in the *RRCSetupComplete* message;

3> if Bluetooth measurement results are included in the logged measurements the UE has available for NR:

4> include the *logMeasAvailableBT* in the *RRCSetupComplete* message;

3> if WLAN measurement results are included in the logged measurements the UE has available for NR:

4> include the *logMeasAvailableWLAN* in the *RRCSetupComplete* message;

2> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:

3> if T330 timer is running and the logged measurements configuration is for NR:

4> set *sigLogMeasConfigAvailable* to *true* in the *RRCSetupComplete* message;

3> else:

4> if the UE has logged measurements available for NR:

5> set *sigLogMeasConfigAvailable* to *false* in the *RRCSetupComplete* message;

2> if the UE has connection establishment failure or connection resume failure information available in *VarConnEstFailReport* or *VarConnEstFailReportList* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport* or in at least one of the entries of *VarConnEstFailReportList*:

3> include *connEstFailInfoAvailable* in the *RRCSetupComplete* message;

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

2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10], and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:

3> include *rlf-InfoAvailable* in the *RRCSetupComplete* message;

2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:

3> include *successHO-InfoAvailable* in the *RRCSetupComplete* message;

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

3> include the *mobilityHistoryAvail* in the *RRCSetupComplete* message;

2> if the UE supports uplink RRC message segmentation of *UECapabilityInformation*:

3> may include the *ul-RRC-Segmentation* in the *RRCSetupComplete* message;

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

3> if *speedStateReselectionPars* is configured in the *SIB2*:

4> include the *mobilityState* in the *RRCSetupComplete* message and set it to the mobility state (as specified in TS 38.304 [20]) of the UE just prior to entering RRC\_CONNECTED state;

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

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

The UE shall:

1> perform the actions as specified in 5.3.15;

#### 5.3.3.6 Cell re-selection or cell selection or relay reselection while T390, T300 or T302 is running (UE in RRC\_IDLE)

The UE shall:

1> if cell reselection occurs while T300 or T302 is running; or

1> if relay reselection occurs while T300 is running; or

1> if cell changes due to relay reselection while T302 is running:

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

1> else:

2> if cell selection or reselection occurs while T390 is running; or

2> cell change due to relay selection or reselection occurs while T390 is running:

3> stop T390 for all access categories;

3> perform the actions as specified in 5.3.14.4.

#### 5.3.3.7 T300 expiry

The UE shall:

1> if timer T300 expires:

2> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;

2> if the UE supports RRC Connection Establishment failure with temporary offset and the T300 has expired a consecutive *connEstFailCount* times on the same cell for which *connEstFailureControl* is included in *SIB1*:

3> for a period as indicated by *connEstFailOffsetValidity*:

4> use *connEstFailOffset* for the parameter *Qoffsettemp* for the concerned cell when performing cell selection and reselection according to TS 38.304 [20] and TS 36.304 [27];

NOTE 1: When performing cell selection, if no suitable or acceptable cell can be found, it is up to UE implementation whether to stop using *connEstFailOffset* for the parameter *Qoffsettemp* during *connEstFailOffsetValidity* for the concerned cell.

2> if the UE supports multiple CEF report:

3> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-identity* stored in *VarConnEstFailReport*; and

3> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport* and if the *maxCEFReport-r17* has not been reached:

4> append the *VarConnEstFailReport* as a new entry in the *VarConnEstFailReportList*;

2> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* and if the RPLMN is not equal to *plmn-identity* stored in *VarConnEstFailReport*; or

2> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport*:

3> reset the *numberOfConnFail* to 0;

2> if the UE supports multiple CEF report and if the UE has connection establishment failure informatoin or connection resume failure information available in *VarConnEstFailReportList* and if the RPLMN is not equal to *plmn-identity* stored in *VarConnEstFailReportList*:

3> clear the content included in *VarConnEstFailReportList*;

2> clear the content included in *VarConnEstFailReport* except for the *numberOfConnFail*, if any;

2> store the following connection establishment failure information in the *VarConnEstFailReport* by setting its fields as follows:

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

3> set the *measResultFailedCell* to include the global cell identity, tracking area code, the cell level and SS/PBCH block level RSRP, and RSRQ, and SS/PBCH block indexes, of the failed cell based on the available SSB measurements collected up to the moment the UE detected connection establishment failure;

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

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

NOTE 2: The UE includes the latest results of the available measurements as used for cell reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 38.133 [14].

3> if available, set the *locationInfo* as follows:

4> if available, set the *commonLocationInfo* to include the detailed location information;

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

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

4> if available, set the *sensor-LocationInfo* to include the sensor measurement results as follows;

5> if available, include the *sensor-MeasurementInformation*;

5> if available, include the *sensor-MotionInformation*;

NOTE 3: Which location information related configuration is used by the UE to make the *locationInfo* available for inclusion in the *VarConnEstFailReport* is left to UE implementation.

3> set *perRAInfoList* to indicate the performed random access procedure related information as specified in 5.7.10.5;

3> if the *numberOfConnFail* is smaller than 8:

4> increment the *numberOfConnFail* by 1;

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

The UE may discard the connection establishment failure or connection resume failure information, i.e. release the UE variable *VarConnEstFailReport*, 48 hours after the last connection establishment failure is detected.

The L2 U2N Relay UE either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

#### 5.3.3.8 Abortion of RRC connection establishment

If upper layers abort the RRC connection establishment procedure, due to a NAS procedure being aborted as specified in TS 24.501 [23], while the UE has not yet entered RRC\_CONNECTED, the UE shall:

1> stop timer T300, if running;

1> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established.

|  |
| --- |
| NEXT CHANGE |

### 5.3.5 RRC reconfiguration

#### 5.3.5.1 General



Figure 5.3.5.1-1: RRC reconfiguration, successful



Figure 5.3.5.1-2: RRC reconfiguration, failure

The purpose of this procedure is to modify an RRC connection, e.g. to establish/modify/release RBs/BH RLC channels/Uu Relay RLC channels/PC5 Relay RLC channels, to perform reconfiguration with sync, to setup/modify/release measurements, to add/modify/release SCells and cell groups, to add/modify/release conditional handover configuration, to add/modify/release conditional PSCell change or conditional PSCell addition configuration. As part of the procedure, NAS dedicated information may be transferred from the Network to the UE.

RRC reconfiguration to perform reconfiguration with sync includes, but is not limited to, the following cases:

- reconfiguration with sync and security key refresh, involving RA to the PCell/PSCell, MAC reset, refresh of security and re-establishment of RLC and PDCP triggered by explicit L2 indicators;

- reconfiguration with sync but without security key refresh, involving RA to the PCell/PSCell, MAC reset and RLC re-establishment and PDCP data recovery (for AM DRB or AM MRB) triggered by explicit L2 indicators.

- reconfiguration with sync for DAPS and security key refresh, involving RA to the target PCell, establishment of target MAC, and

- for non-DAPS bearer: refresh of security and re-establishment of RLC and PDCP triggered by explicit L2 indicators;

- for DAPS bearer: establishment of RLC for the target PCell, refresh of security and reconfiguration of PDCP to add the ciphering function, the integrity protection function and ROHC function of the target PCell;

- for SRB: refresh of security and establishment of RLC and PDCP for the target PCell;

- reconfiguration with sync for DAPS but without security key refresh, involving RA to the target PCell, establishment of target MAC, and

- for non-DAPS bearer: RLC re-establishment and PDCP data recovery (for AM DRB or AM MRB) triggered by explicit L2 indicators.

- for DAPS bearer: establishment of RLC for target PCell, reconfiguration of PDCP to add the ciphering function, the integrity protection function and ROHC function of the target PCell;

- for SRB: establishment of RLC and PDCP for the target PCell.

- reconfiguration with sync for direct-to-indirect path switch, not involving RA at target side, involving re-establishment of PDCP /PDCP data recovery (for AM DRB) triggered by explicit L2 indicators.

In (NG)EN-DC and NR-DC, SRB3 can be used for measurement configuration and reporting, for UE assistance (re-)configuration and reporting for power savings, for IP address (re-)configuration and reporting for IAB-nodes, to (re-)configure MAC, RLC, BAP, physical layer and RLF timers and constants of the SCG configuration, and to reconfigure PDCP for DRBs associated with the S-KgNB or SRB3, and to reconfigure SDAP for DRBs associated with S-KgNB in NGEN-DC and NR-DC, and to add/modify/release conditional PSCell change configuration, provided that the (re-)configuration does not require any MN involvement, and to transmit RRC messages between the MN and the UE during fast MCG link recovery. In (NG)EN-DC and NR-DC, only *measConfig*, *radioBearerConfig, conditionalReconfiguration, bap-Config*, *iab-IP-AddressConfigurationList, otherConfig* and/or *secondaryCellGroup* are included in *RRCReconfiguration* received via SRB3, except when *RRCReconfiguration* is received within *DLInformationTransferMRDC*.

#### 5.3.5.2 Initiation

The Network may initiate the RRC reconfiguration procedure to a UE in RRC\_CONNECTED. The Network applies the procedure as follows:

- the establishment of RBs (other than SRB1, that is established during RRC connection establishment) is performed only when AS security has been activated;

- the establishment of BH RLC Channels for IAB is performed only when AS security has been activated;

- the establishment of Uu Relay RLC channels and PC5 Relay RLC channels (other than SL-RLC0 and SL-RLC1, that is established before RRC connection establishment) for L2 U2N Relay UE is performed only when AS security has been activated, and the establishment of PC5 Relay RLC channels for L2 U2N Remote UE (other than SL-RLC0 and SL-RLC1, that is established before RRC connection establishment) is performed only when AS security has been activated;

- the addition of Secondary Cell Group and SCells is performed only when AS security has been activated;

- the *reconfigurationWithSync* is included in *secondaryCellGroup* only when at least one RLC bearer or BH RLC channel is setup in SCG;

- the *reconfigurationWithSync* is included in *masterCellGroup* only when AS security has been activated, and SRB2 with at least one DRB or multicast MRB or, for IAB, SRB2, are setup and not suspended;

- the *conditionalReconfiguration* for CPC is included only when at least one RLC bearer is setup in SCG;

- the *conditionalReconfiguration* for CHO or CPA is included only when AS security has been activated, and SRB2 with at least one DRB or multicast MRB or, for IAB, SRB2, are setup and not suspended.

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

The UE shall perform the following actions upon reception of the *RRCReconfiguration,* or upon execution of the conditional reconfiguration (CHO, CPA or CPC):

1> if the *RRCReconfiguration* is applied due to a conditional reconfiguration execution upon cell selection performed while timer T311 was running, as defined in 5.3.7.3:

2> remove all the entries within *VarConditionalReconfig*, if any;

1> if the *RRCReconfiguration* includes the *daps-SourceRelease*:

2> reset the source MAC and release the source MAC configuration;

2> for each DAPS bearer:

3> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;

3> reconfigure the PDCP entity to release DAPS as specified in TS 38.323 [5];

2> for each SRB:

3> release the PDCP entity for the source SpCell;

3> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;

2> release the physical channel configuration for the source SpCell;

2> discard the keys used in the source SpCell (the KgNB key, the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key), if any;

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;

NOTE 0: If this *RRCReconfiguration* is associated to the MCG and includes *reconfigurationWithSync* in *spCellConfig* and *dedicatedSIB1-Delivery*, the UE initiates (if needed) the request to acquire required SIBs, according to clause 5.2.2.3.5, only after the random access procedure towards the target SpCell is completed.

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 *dedicatedPosSysInfoDelivery*:

2> perform the action upon reception of the contained posSIB(s), as specified in clause 5.2.2.4.16;

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

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

1> if the *RRCReconfiguration* message includes the *bap-Config*:

2> perform the BAP configuration procedure as specified in 5.3.5.12;

1> if the *RRCReconfiguration* message includes the *iab-IP-AddressConfigurationList*:

2> if *iab-IP-AddressToReleaseList* is included:

3> perform release of IP address as specified in 5.3.5.12a.1.1;

2> if *iab-IP-AddressToAddModList* is included:

3> perform IAB IP address addition/update as specified in 5.3.5.12a.1.2;

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

2> perform conditional reconfiguration as specified in 5.3.5.13;

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

2> if *needForGapsConfigNR* is set to *setup*:

3> consider itself to be configured to provide the measurement gap requirement information of NR target bands;

2> else:

3> consider itself not to be configured to provide the measurement gap requirement information of NR target bands;

1> if the *RRCReconfiguration* message includes the *needForGapNCSG-ConfigNR*:

2> if *needForGapNCSG-ConfigNR* is set to *setup*:

3> consider itself to be configured to provide the measurement gap and NCSG requirement information of NR target bands;

2> else:

3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of NR target bands;

1> if the *RRCReconfiguration* message includes the *needForGapNCSG-ConfigEUTRA*:

2> if *needForGapNCSG-ConfigEUTRA* is set to *setup*:

3> consider itself to be configured to provide the measurement gap and NCSG requirement information of E‑UTRA target bands;

2> else:

3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of E‑UTRA target bands;

1> if the *RRCReconfiguration* message includes the *sl-ConfigDedicatedNR*:

2> perform the sidelink dedicated configuration procedure as specified in 5.3.5.14;

NOTE 0a: If the *sl-ConfigDedicatedNR* was received embedded within an E-UTRA *RRCConnectionReconfiguration* message, the UE does not build an NR *RRCReconfigurationComplete* message for the received *sl-ConfigDedicatedNR*.

1> if the *RRCReconfiguration* message includes the *sl-L2RelayUE-Config*:

2> perform the L2 U2N Relay UE configuration procedure as specified in 5.3.5.15;

1> if the *RRCReconfiguration* message includes the *sl-L2RemoteUE-Config*:

2> perform the L2 U2N Remote UE configuration procedure as specified in 5.3.5.16;

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

2> perform the *Paging* message reception procedure as specified in 5.3.2.3;

1> if the *RRCReconfiguration* message includes the *sl-ConfigDedicatedEUTRA-Info*:

2> perform related procedures for V2X sidelink communication in accordance with TS 36.331 [10], clause 5.3.10 and clause 5.5.2;

1> if the *RRCReconfiguration* message includes the *ul-GapFR2-Config*:

2> perform the FR2 UL gap configuration procedure as specified in 5.3.5.13c;

1> if the *RRCReconfiguration* message includes the *musim-GapConfig*:

2> for each *musim-GapId* included in the received *musim-GapToReleaseList*:

3> release the periodic MUSIM gap associated to the *musim-GapId*;

2> for each *musim-GapId* included in the received *musim-GapToAddModList* that is part of the current UE configuration:

3> reconfigure the entry with the value received for this *musim-GapId*;

2> for each *musim-GapId* included in the received *musim-GapToAddModList* that is not part of the current UE configuration:

3> add a new entry for this *musim-GapId*;

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

2> perform the application layer measurement configuration procedure as specified in 5.3.5.13d;

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

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

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

3> include *uplinkDirectCurrentBWP-SUL* for each MCG serving cell configured with SUL carrier, if any, within the *uplinkTxDirectCurrentList*;

2> if the *RRCReconfiguration* includes the *masterCellGroup* containing the *reportUplinkTxDirectCurrentTwoCarrier*:

3> include in the *uplinkTxDirectCurrentTwoCarrierList* the list of uplink Tx DC locations for the configured intra-band uplink carrier aggregation in the MCG;

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

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

3> include *uplinkDirectCurrentBWP-SUL* for each SCG serving cell configured with SUL carrier, if any, within the *uplinkTxDirectCurrentList*;

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

3> include in the *uplinkTxDirectCurrentTwoCarrierList* the list of uplink Tx DC locations for the configured intra-band uplink carrier aggregation in the SCG;

NOTE 0b: It is expected that the *reportUplinkTxDirectCurrentTwoCarrier* is only received either in *masterCellGroup* or in *secondaryCellGroup* but not both.

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 SCG *RRCReconfigurationComplete* message;

3> if the *RRCReconfiguration* message is applied due to conditional reconfiguration execution and the *RRCReconfiguration* message does not include the *reconfigurationWithSync* in the *masterCellGroup*:

4> include in the *selectedCondRRCReconfig* the *condReconfigId* for the selected cell of conditional reconfiguration execution;

2> if the *RRCReconfiguration* includes the *reconfigurationWithSync* in *spCellConfig* of an MCG:

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

4> include the *logMeasAvailable* in the *RRCReconfigurationComplete* message;

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

5> include the *logMeasAvailableBT* in the *RRCReconfigurationComplete* message;

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

5> include the *logMeasAvailableWLAN* in the *RRCReconfigurationComplete* message;

3> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:

4> if T330 timer is running and the logged measurements configuration is for NR:

5> set *sigLogMeasConfigAvailable* to *true* in the *RRCReconfigurationComplete* message;

4> else:

5> if the UE has logged measurements available for NR:

6> set *sigLogMeasConfigAvailable* to false in the *RRCReconfigurationComplete* message;

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

4> include *connEstFailInfoAvailable* in the *RRCReconfigurationComplete* message;

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

3> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:

4> include *rlf-InfoAvailable* in the *RRCReconfigurationComplete* message;

3> if the UE was configured with *successHO-Config* when connected to the source PCell; and

3> if the applied *RRCReconfiguration* is not due to a conditional reconfiguration execution upon cell selection performed while timer T311 was running, as defined in 5.3.7.3:

4> perform the actions for the successful handover report determination as specified in clause 5.7.10.6, upon successfully completing the Random Access procedure triggered for the *reconfigurationWithSync* in *spCellConfig* of the MCG;

3> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:

4> include *successHO-InfoAvailable* in the *RRCReconfigurationComplete* message;

2> if the *RRCReconfiguration* message was received via SRB1, but not within *mrdc-SecondaryCellGroup* or E-UTRA *RRCConnectionReconfiguration* or E-UTRA *RRCConnectionResume*:

3> if the UE is configured to provide the measurement gap requirement information of NR target bands:

4> if the *RRCReconfiguration* message includes the *needForGapsConfigNR*; or

4> if the *NeedForGapsInfoNR* information is changed compared to last time the UE reported this information:

5> include the *NeedForGapsInfoNR* and set the contents as follows:

6> include *intraFreq-needForGap* and set the gap requirement information of intra-frequency measurement for each NR serving cell;

6> if *requestedTargetBandFilterNR* is configured:

7> for each supported NR band that is also included in *requestedTargetBandFilterNR*, include an entry in *interFreq-needForGap* and set the gap requirement information for that band;

6> else:

7> include an entry in *interFreq-needForGap* and set the corresponding gap requirement information for each supported NR band;

3> if the UE is configured to provide the measurement gap and NCSG requirement information of NR target bands:

4> if the *RRCReconfiguration* message includes the *needForGapNCSG-ConfigNR*; or

4> if the *needForGapNCSG-InfoNR* information is changed compared to last time the UE reported this information:

5> include the *NeedForGapNCSG-InfoNR* and set the contents as follows:

6> include *intraFreq-needForNCSG* and set the gap and NCSG requirement information of intra-frequency measurement for each NR serving cell;

6> if *requestedTargetBandFilterNCSG-NR* is configured:

7> for each supported NR band included in *requestedTargetBandFilterNCSG-NR*, include an entry in *interFreq-needForNCSG* and set the NCSG requirement information for that band;

6> else:

7> include an entry for each supported NR band in *interFreq-needForNCSG* and set the corresponding NCSG requirement information;

3> if the UE is configured to provide the measurement gap and NCSG requirement information of E‑UTRA target bands:

4> if the *RRCReconfiguration* message includes the *needForGapNCSG-ConfigEUTRA*; or

4> if the *needForGapNCSG-InfoEUTRA* information is changed compared to last time the UE reported this information:

5> include the *NeedForGapNCSG-InfoEUTRA* and set the contents as follows:

6> if *requestedTargetBandFilterNCSG-EUTRA* is configured, for each supported E-UTRA band included in *requestedTargetBandFilterNCSG-EUTRA*, include an entry in *needForNCSG-EUTRA* and set the NCSG requirement information for that band; otherwise, include an entry for each supported E-UTRA band in *needForNCSG-EUTRA* and set the corresponding NCSG requirement information;

1> if the UE is configured with E-UTRA *nr-SecondaryCellGroupConfig* (UE in (NG)EN-DC):

2> if the *RRCReconfiguration* message was received via E-UTRA SRB1 as specified in TS 36.331 [10]; or

2> if the *RRCReconfiguration* message was received via E-UTRA RRC message *RRCConnectionReconfiguration* within *MobilityFromNRCommand* (handover from NR standalone to (NG)EN-DC);

3> if the *RRCReconfiguration* is applied due to a conditional reconfiguration execution for CPC which is configured via *conditionalReconfiguration* contained in *nr-SecondaryCellGroupConfig* specified in TS 36.331 [10]:

4> submit the *RRCReconfigurationComplete* message via the E-UTRA MCG embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10], clause 5.6.2a.

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

4> submit the *RRCReconfigurationComplete* message via E-UTRA embedded in E-UTRA RRC message *RRCConnectionResumeComplete* as specified in TS 36.331 [10], clause 5.3.3.4a;

3> else:

4> submit the *RRCReconfigurationComplete* via E-UTRA embedded in E-UTRA RRC message *RRCConnectionReconfigurationComplete* as specified in TS 36.331 [10], clause 5.3.5.3/5.3.5.4/5.4.2.3;

3> if the *scg-State* is not included in the E-UTRA *RRCConnectionReconfiguration* message or E-UTRA *RRCConnectionResume* message containing the *RRCReconfiguration* message:

4> perform SCG activation as specified in 5.3.5.13a;

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

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

4> else if the SCG was deactivated before the reception of the E-UTRA RRC message containing the *RRCReconfiguration* message:

5> if *bfd-and-RLM* was not configured to *true* before the reception of the E-UTRA *RRCConnectionReconfiguration* or *RRCConnectionResume* message containing the *RRCReconfiguration* message or if lower layers indicate that a Random Access procedure is needed for SCG activation:

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

5> else:

6> the procedure ends;

4> else:

5> the procedure ends;

3> else:

4> perform SCG deactivation as specified in 5.3.5.13b;

4> the procedure ends;

2> if the *RRCReconfiguration* message was received within *nr-SecondaryCellGroupConfig* in *RRCConnectionReconfiguration* message received via SRB3 within *DLInformationTransferMRDC*:

3> submit the *RRCReconfigurationComplete* via E-UTRA 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) but not within *DLInformationTransferMRDC*:

3> 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 or within *DLInformationTransferMRDC* via SRB3, 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 but not within *DLInformationTransferMRDC*, 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* (UE in NR-DC, *mrdc-SecondaryCellGroup* was received in *RRCReconfiguration* or *RRCResume* via SRB1):

2> if the *RRCReconfiguration* is applied due to a conditional reconfiguration execution for CPC which is configured via *conditionalReconfiguration* contained in *nr-SCG* within *mrdc-SecondaryCellGroup*:

3> submit the *RRCReconfigurationComplete* message via the NR MCG embedded in NR RRC message *ULInformationTransferMRDC* as specified in clause 5.7.2a.3.

2> if the *scg-State* is not included in the *RRCReconfiguration* or *RRCResume* message containing the *RRCReconfiguration* message:

3> if the SCG was deactivated before the reception of the NR RRC message containing the *RRCReconfiguration* message:

4> perform SCG activation as specified in 5.3.5.13a;

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

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

3> else if the SCG was deactivated before the reception of the NR RRC message containing the *RRCReconfiguration* message:

4> if *bfd-and-RLM* was not configured to *true* before the reception of the *RRCReconfiguration* or *RRCResume* message containing the *RRCReconfiguration* message; or

4> if lower layers indicate that a Random Access procedure is needed for SCG activation:

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

4> else:

5> the procedure ends;

3> else:

4> the procedure ends;

2> else

3> perform SCG deactivation as specified in 5.3.5.13b;

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 (UE in NR-DC):

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> else:

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

2> else:

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

1> else(*RRCReconfiguration* was received via SRB1):

2> if the UE is in NR-DC and;

2> if the *RRCReconfiguration* does not include the *mrdc-SecondaryCellGroupConfig*:

3> if the *RRCReconfiguration* includes the *scg-State*:

4> perform SCG deactivation as specified in 5.3.5.13b;

3> else:

4> perform SCG activation without SN message as specified in 5.3.5.13b1;

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, SRB4, DRBs, multicast MRB, and BH RLC channels for IAB-MT, 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, or,

1> if *sl-PathSwitchConfig* was included in *reconfigurationWithSync* included in *spCellConfig* of an MCG, and when successfully sending *RRCReconfigurationComplete* message (i.e., PC5 RLC acknowledgement is received from target L2 U2N Relay UE):

2> stop timer T304 for that cell group if running;

2> if *sl-PathSwitchConfig* was included in *reconfigurationWithSync*:

3> stop timer T420;3> release all radio resources, including release of the RLC entities and the MAC configuration at the source side;

NOTE : PDCP and SDAP configured by the source prior to the path switch that are reconfigured and re-used by target when delta signalling.

2> stop timer T310 for source SpCell if running;

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> for each DRB configured as DAPS bearer, request uplink data switching to the PDCP entity, as specified in TS 38.323 [5];

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 T350 is running:

4> stop timer T350;

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 the *reconfigurationWithSync* was included in *spCellConfig* of an MCG; or

2> if the *reconfigurationWithSync* was included in *spCellConfig* of an SCG and the CPA or CPC was configured

3> remove all the entries within *VarConditionalReconfig*, if any;

3> remove all the entries within *VarConditionalReconfiguration* as specified in TS 36.331 [10], clause 5.3.5.9.6, if any;

3> for each *measId* of the MCG *measConfig*, if configured, and for each *measId* of the SCG *measConfig*, if configured, if the associated *reportConfig* has a *reportType* set to *condTriggerConfig*:

4> for the associated *reportConfigId*:

5> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;

4> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:

5> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;

4> remove the entry with the matching *measId* from the *measIdList* within the *VarMeasConfig*;

2> if *reconfigurationWithSync* was included in *masterCellGroup* or *secondaryCellGroup*:

3> if the UE initiated transmission of a *UEAssistanceInformation* message for the corresponding cell group during the last 1 second, and the UE is still configured to provide the concerned UE assistance information for the corresponding cell group; or

3> if the *RRCReconfiguration* message is applied due to a conditional reconfiguration execution, and the UE is configured to provide UE assistance information for the corresponding cell group, and the UE has initiated transmission of a *UEAssistanceInformation* message for the corresponding cell group since it was configured to do so in accordance with 5.7.4.2:

4> initiate transmission of a *UEAssistanceInformation* message for the corresponding cell group in accordance with clause 5.7.4.3 to provide the concerned UE assistance information;

4> start or restart the prohibit timer (if exists) or the leave without response timer for the MUSIM associated with the concerned UE assistance information with the timer value set to the value in corresponding configuration;

3>if *SIB12* is provided by the target PCell, and the UE initiated transmission of a *SidelinkUEInformationNR* message indicating a change of NR sidelink communication/discovery related parameters relevant in target PCell (i.e. change of *sl-RxInterestedFreqList* or *sl-TxResourceReqList*) during the last 1 second preceding reception of the *RRCReconfiguration* message including *reconfigurationWithSync* in *spCellConfig* of an MCG; or

3> if the *RRCReconfiguration* message is applied due to a conditional reconfiguration execution and the UE is capable of NR sidelink communication/discovery and *SIB12* is provided by the target PCell, and the UE has initiated transmission of a *SidelinkUEInformationNR* message since it was configured to do so in accordance with 5.8.3.2:

4> initiate transmission of the *SidelinkUEInformationNR* message in accordance with 5.8.3.3;

3> if configured with application layer measurements and if application layer measurement report container has been received from upper layers for which the successful transmission of the message or at least one segment of the message has not been confirmed by lower layers:

4> re-submit the *MeasurementReportAppLayer* message or all segments of the *MeasurementReportAppLayer* message to lower layers for transmission via SRB4;

2> if *reconfigurationWithSync* was included in *masterCellGroup* and the target cell provides *SIB21*:

3> if the UE initiated transmission of a *MBSInterestIndication*message during the last 1 second preceding reception of this *RRCReconfiguration* message; or

3> if the *RRCReconfiguration* message is applied due to a conditional reconfiguration execution, and the UE has initiated transmission of a *MBSInterestIndication* message after having received this *RRCReconfiguration* message:

4> initiate transmission of a *MBSInterestIndication*message in accordance with clause 5.9.4;

2> the procedure ends.

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

NOTE 4: The UE sets the content of *UEAssistanceInformation* according to latest configuration (i.e. the configuration after applying the *RRCReconfiguration* message) and latest UE preference. The UE may include more than the concerned UE assistance information within the *UEAssistanceInformation* according to 5.7.4.2. Therefore, the content of *UEAssistanceInformation* message might not be the same as the content of the previous *UEAssistanceInformation* message.

#### 5.3.5.4 Secondary cell group release

The UE shall:

1> as a result of SCG release triggered by E-UTRA (i.e. (NG)EN-DC case) or NR (i.e. NR-DC case):

2> reset SCG MAC, if configured;

2> for each RLC bearer that is part of the SCG configuration:

3> perform RLC bearer release procedure as specified in 5.3.5.5.3;

2> for each BH RLC channel that is part of the SCG configuration:

3> perform BH RLC channel release procedure as specified in 5.3.5.5.10;

2> release the SCG configuration;

2> if CPC was configured:

3> remove all the entries within *VarConditionalReconfig*, if any;

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

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

2> stop timer T304 for the corresponding SpCell, if running.

NOTE: Release of cell group means only release of the lower layer configuration of the cell group but the *RadioBearerConfig* may not be released.

#### 5.3.5.5 Cell Group configuration

##### 5.3.5.5.1 General

The network configures the UE with Master Cell Group (MCG), and zero or one Secondary Cell Group (SCG). In (NG)EN-DC, the MCG is configured as specified in TS 36.331 [10], and for NE-DC, the SCG is configured as specified in TS 36.331 [10]. The network provides the configuration parameters for a cell group in the *CellGroupConfig* IE.

The UE performs the following actions based on a received *CellGroupConfig* IE:

1> if the *CellGroupConfig* contains the *spCellConfig* with *reconfigurationWithSync*:

2> perform Reconfiguration with sync according to 5.3.5.5.2;

2> resume all suspended radio bearers except the SRBs for the source cell group, and resume SCG transmission for all radio bearers, and resume BH RLC channels and resume SCG transmission for BH RLC channels for IAB-MT, if suspended;

NOTE: If the SCG is deactivated, resuming SCG transmission for all radio bearers does not imply that PDCP PDUs can be transmitted or received on SCG RLC bearers.

1> if the *CellGroupConfig* contains the *rlc-BearerToReleaseList or rlc-BearerToReleaseListExt*:

2> perform RLC bearer release as specified in 5.3.5.5.3;

1> if the *CellGroupConfig* contains the *rlc-BearerToAddModList*:

2> perform the RLC bearer addition/modification as specified in 5.3.5.5.4;

1> if the *CellGroupConfig* contains the *mac-CellGroupConfig*:

2> configure the MAC entity of this cell group as specified in 5.3.5.5.5;

1> if the *CellGroupConfig* contains the *sCellToReleaseList*:

2> perform SCell release as specified in 5.3.5.5.8;

1> if the *CellGroupConfig* contains the *spCellConfig*:

2> configure the SpCell as specified in 5.3.5.5.7;

1> if the *CellGroupConfig* contains the *sCellToAddModList*:

2> perform SCell addition/modification as specified in 5.3.5.5.9;

1> if the *CellGroupConfig* contains the *bh-RLC-ChannelToReleaseList*:

2> perform BH RLC channel release as specified in 5.3.5.5.10;

1> if the *CellGroupConfig* contains the *bh-RLC-ChannelToAddModList*:

2> perform the BH RLC channel addition/modification as specified in 5.3.5.5.11;

1> if the *CellGroupConfig* contains the *uu-RelayRLC-ChannelToReleaseList*:

2> perform Uu Relay RLC channel release as specified in 5.3.5.5.12;

1> if the *CellGroupConfig* contains the *uu-RelayRLC-ChannelToAddModList*:

2> perform the Uu Relay RLC channel addition/modification as specified in 5.3.5.5.13;

##### 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> if no DAPS bearer is configured:

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

1> if this procedure is executed for the MCG:

2> if timer T316 is running;

3> stop timer T316;

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

2> resume MCG transmission, if suspended.

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

1> if *sl-PathSwitchConfig* is included:

2> consider the target L2 U2N Relay UE to be the one indicated by the *targetRelayUE-Identity* in the *sl-PathSwitchConfig*;

2> start timer T420 for the corresponding target L2 U2N Relay UE with the timer value set to *T420*, as included in the *sl-PathSwitchConfig*;

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

2> indicate to upper layer (to trigger the PC5 unicast link establishment) with the target L2 U2N Relay UE indicated by the *targetRelayUE-Identity*;

2> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;

1> else (*sl-PathSwitchConfig* is not included):

2> if this procedure is executed for the MCG or if this procedure is executed for an SCG not indicated as deactivated in the E-UTRA or NR RRC message in which the *RRCReconfiguration* message is embedded:

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

2> if the *frequencyInfoDL* is included:

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

2> else:

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

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

2> if *ta-Report* is configured with value *enabled* and the UE supports TA reporting;

3> indicate TA report initiation to lower layers;

2> apply the specified BCCH configuration defined in 9.1.1.1 for the target SpCell;

2> acquire the *MIB* of the target SpCell, 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.

NOTE 2a: A UE with DAPS bearer does not monitor for system information updates in the source PCell.

2> If any DAPS bearer is configured:

3> create a MAC entity for the target cell group with the same configuration as the MAC entity for the source cell group;

3> for each DAPS bearer:

4> establish an RLC entity or entities for the target cell group, with the same configurations as for the source cell group;

4> establish the logical channel for the target cell group, with the same configurations as for the source cell group;

NOTE 2b: In order to understand if a DAPS bearer is configured, the UE needs to check the presence of the field *daps-Config* within the *RadioBearerConfig* IE received in *radioBearerConfig* or *radioBearerConfig2*.

3> for each SRB:

4> establish an RLC entity for the target cell group, with the same configurations as for the source cell group;

4> establish the logical channel for the target cell group, with the same configurations as for the source cell group;

3> suspend SRBs for the source cell group;

NOTE 3: Void

3> apply the value of the *newUE-Identity* as the C-RNTI in the target cell group;

3> configure lower layers for the target SpCell in accordance with the received s*pCellConfigCommon*;

3> configure lower layers for the target SpCell in accordance with any additional fields, not covered in the previous, if included in the received *reconfigurationWithSync.*

2> else:

3> reset the MAC entity of this cell group;

3> consider the SCell(s) of this cell group, if configured, that are not included in the *SCellToAddModList* in the *RRCReconfiguration* message, to be in deactivated state;

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

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

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

2> if the UE is acting as L2 U2N Remote UE at the source side:

3> indicate upper layer to trigger PC5 unicast link release.

Upon L2 U2N Relay UE receiving *reconfigurationWithSync*, it either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

##### 5.3.5.5.3 RLC bearer release

The UE shall:

1> for each *logicalChannelIdentity/LogicalChannelIdentityExt* value included in the *rlc-BearerToReleaseList/rlc-BearerToReleaseListExt* that is part of the current UE configuration within the same cell group (LCH release); or

1> for each *logicalChannelIdentity* value that is to be released as the result of an SCG release according to 5.3.5.4:

2> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3;

2> release the corresponding logical channel.

##### 5.3.5.5.4 RLC bearer addition/modification

For each *RLC-BearerConfig* received in the *rlc-BearerToAddModList* IE the UE shall:

1> if the UE's current configuration contains an RLC bearer with the received *logicalChannelIdentity/LogicalChannelIdentityExt* within the same cell group:

2> if the RLC bearer is associated with an DAPS bearer, or

2> if any DAPS bearer is configured and the RLC bearer is associated with an SRB:

3> reconfigure the RLC entity or entities for the target cell group in accordance with the received *rlc-Config*;

3> reconfigure the logical channel for the target cell group in accordance with the received *mac-LogicalChannelConfig*;

2> else:

3> if *reestablishRLC* is received:

4> re-establish the RLC entity as specified in TS 38.322 [4];

3> reconfigure the RLC entity or entities in accordance with the received *rlc-Config*;

3> reconfigure the logical channel in accordance with the received *mac-LogicalChannelConfig*;

3> if *servedMBS-RadioBearer* is received:

4> associate this logical channel with the PDCP entity identified by *servedMBS-RadioBearer*;

NOTE 1: For DRB and SRB, the network does not re-associate an already configured logical channel with another radio bearer. Hence *servedRadioBearer* is not present in this case.

NOTE 2: In DAPS handover, the UE may perform RLC entity re-establishment (if *reestablishRLC* is set) for an RLC bearer associated with a non-DAPS bearer when indication of successful completion of random access towards target cell is received from lower layers as specified in TS 38.321 [3].

1> else (a logical channel with the given *logicalChannelIdentity/LogicalChannelIdentityExt* is not configured within the same cell group, including the case when full configuration option is used):

2> if the *servedRadioBearer* associates the logical channel with an SRB and *rlc-Config* is not included:

3> establish an RLC entity in accordance with the default configuration defined in 9.2 for the corresponding SRB;

2> else:

3> establish an RLC entity in accordance with the received *rlc-Config*;

2> if the *servedRadioBearer* associates the logical channel with an SRB and if *mac-LogicalChannelConfig* is not included:

3> configure this MAC entity with a logical channel in accordance to the default configuration defined in 9.2 for the corresponding SRB;

2> else:

3> configure this MAC entity with a logical channel in accordance to the received *mac-LogicalChannelConfig*;

2> associate this logical channel with the PDCP entity identified by *servedRadioBearer* or *servedMBS-RadioBearer*.

##### 5.3.5.5.5 MAC entity configuration

The UE shall:

1> if SCG MAC is not part of the current UE configuration (i.e. SCG establishment):

2> create an SCG MAC entity;

1> if any DAPS bearer is configured:

2> reconfigure the MAC main configuration for the target cell group in accordance with the received *mac-CellGroupConfig* excluding *tag-ToReleaseList* and *tag-ToAddModList*;

1> else:

2> reconfigure the MAC main configuration of the cell group in accordance with the received *mac-CellGroupConfig* excluding *tag-ToReleaseList* and *tag-ToAddModList*;

1> if the received *mac-CellGroupConfig* includes the *tag-ToReleaseList*:

2> for each *TAG-Id* value included in the *tag-ToReleaseList* that is part of the current UE configuration:

3> release the TAG indicated by *TAG-Id*;

1> if the received *mac-CellGroupConfig* includes the *tag-ToAddModList*:

2> for each *tag-Id* value included in *tag-ToAddModList* that is not part of the current UE configuration (TAG addition):

3> add the TAG, corresponding to the *tag-Id*, in accordance with the received *timeAlignmentTimer*;

2> for each *tag-Id* value included in *tag-ToAddModList* that is part of the current UE configuration (TAG modification):

3> reconfigure the TAG, corresponding to the *tag-Id*, in accordance with the received *timeAlignmentTimer*.

##### 5.3.5.5.6 RLF Timers & Constants configuration

The UE shall:

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

2> if any DAPS bearer is configured:

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

2> else:

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

1> else:

2> if any DAPS bearer is configured:

3> configure the value of timers and constants for the target cell group in accordance with received *rlf-TimersAndConstants*;

2> else:

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

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

3> stop timer T312 for this cell group, if running;

3> reset the counters N310 and N311.

##### 5.3.5.5.7 SpCell Configuration

The UE shall:

1> if the UE is acting as L2 U2N Remote UE:

2> if the *SpCellConfig* contains the *rlf-TimersAndConstants* which is set to *setup*:

3> use value for timers T311 as received in *rlf-TimersAndConstants*;

2> else:

3> use value for timers T311, as included in *ue-TimersAndConstants* received in *SIB1*;

1> else

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

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

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

3> if any DAPS bearer is configured:

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

3> else

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

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

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

3> consider the bandwidth part indicated in *firstActiveUplinkBWP-Id*, if included in the *spCellConfigDedicated,* to be the active uplink bandwidth part;

3> if the *firstActiveDownlinkBWP-Id* is included in the *spCellConfigDedicated*:

4> if the *SpCellConfig* is included in an *RRCReconfiguration* message contained in an NR or E-UTRA RRC message indicating that the SCG is deactivated:

5> consider the bandwidth part indicated in *firstActiveDownlinkBWP-Id* to be the bandwidth part for Radio Link Monitoring, Beam Failure Detection and measurements;

4> else:

5> consider the bandwith part indicated in *firstActiveDownlinkBWP-Id* to be the active downlink bandwidth part;

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

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

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

4> reset the counters N310 and N311.

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

2> the UE may perform the evaluation of the low mobility criterion for this cell group as specified in 5.7.13.1;

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

2> the UE may perform the evaluation of the good serving cell quality criterion for this SpCell as specified in 5.7.13.2;

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

2> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.13.2;

##### 5.3.5.5.8 SCell Release

The UE shall:

1> if the release is triggered by reception of the *sCellToReleaseList*:

2> for each *sCellIndex* value included in the *sCellToReleaseList*:

3> if the current UE configuration includes an SCell with value *sCellIndex*:

4> release the SCell.

##### 5.3.5.5.9 SCell Addition/Modification

The UE shall:

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

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

2> if the *sCellState* is included:

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

2> else:

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

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

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

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

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

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

3> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.13.2.

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

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

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

3> if the *sCellState* is included:

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

3> else:

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

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

3> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.13.2.

##### 5.3.5.5.10 BH RLC channel release

The IAB-node shall:

1> for each *BH-RLC-ChannelID* value included in the *bh-RLC-ChannelToReleaseList* that is part of the current IAB-node configuration within the same cell group (LCH release); or

1> for each *BH-RLC-ChannelID* value that is to be released as the result of an SCG release according to 5.3.5.4:

2> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3;

2> release the corresponding logical channel.

##### 5.3.5.5.11 BH RLC channel addition/modification

For each *BH-RLC-ChannelConfig* received in the *bh-RLC-ChannelToAddModList* IE the IAB-node shall:

1> if the current configuration contains a BH RLC Channel with the received *bh-RLC-ChannelID* within the same cell group:

2> if *reestablishRLC* is received:

3> re-establish the RLC entity as specified in TS 38.322 [4];

2> reconfigure the RLC entity or entities in accordance with the received *rlc-Config*;

2> reconfigure the logical channel in accordance with the received *mac-LogicalChannelConfig*;

1> else (a backhaul logical channel with the given *BH-RLC-ChannelID* was not configured before within the same cell group):

2> establish an RLC entity in accordance with the received *rlc-Config*;

2> configure this MAC entity with a logical channel in accordance to the received *mac-LogicalChannelConfig*.

##### 5.3.5.5.12 Uu Relay RLC channel release

The L2 U2N Relay UE shall:

1> for each *Uu-RelayRLC-ChannelID* value included in the *uu-RelayRLC-ChannelToReleaseList* that is part of the current configuration within the same cell group (LCH release):

2> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3;

2> release the corresponding logical channel.

##### 5.3.5.5.13 Uu Relay RLC channel addition/modification

For each *Uu-RelayRLC-ChannelConfig* received in the *uu-RelayRLC-ChannelToAddModList* the L2 U2N Relay UE shall:

1> if the current configuration contains a Uu Relay RLC channel with the same *uu-RelayRLC-ChannelID* within the same cell group:

2> if *reestablishRLC* is received:

3> re-establish the RLC entity as specified in TS 38.322 [4];

2> reconfigure the RLC entity in accordance with the received *rlc-Config*;

2> reconfigure the logical channel in accordance with the received *mac-LogicalChannelConfig*;

1> else (a logical channel with the given *uu-RelayRLC-ChannelID* was not configured before within the same cell group):

2> establish an RLC entity in accordance with the received *rlc-Config*;

2> configure this MAC entity with a logical channel in accordance to the received *mac-LogicalChannelConfig*.

#### 5.3.5.6 Radio Bearer configuration

##### 5.3.5.6.1 General

The UE shall perform the following actions based on a received *RadioBearerConfig* IE:

1> if the *RadioBearerConfig* includes the *srb3-ToRelease* or *srb4-ToRelease*:

2> perform the SRB release as specified in 5.3.5.6.2;

1> if the *RadioBearerConfig* includes the *srb-ToAddModList* or ifany DAPS beareris configured:

2> perform the SRB addition or reconfiguration as specified in 5.3.5.6.3;

1> if the *RadioBearerConfig* includes the *drb-ToReleaseList*:

2> perform DRB release as specified in 5.3.5.6.4;

1> if the *RadioBearerConfig* includes the *drb-ToAddModList*:

2> perform DRB addition or reconfiguration as specified in 5.3.5.6.5;

1> if the *RadioBearerConfig* includes the *mrb-ToReleaseList*:

2> perform multicast MRB release as specified in 5.3.5.6.6;

1> if the *RadioBearerConfig* includes the *mrb-ToAddModList*:

2> perform multicast MRB addition or reconfiguration as specified in 5.3.5.6.7;

1> release all SDAP entities, if any, that have no associated DRB as specified in TS 37.324 [24] clause 5.1.2, and indicate the release of the user plane resources for PDU Sessions associated with the released SDAP entities to upper layers;

1> release all SDAP entities that have no associated multicast MRB as specified in TS 37.324 [24] clause 5.1.2, and indicate the release of user plane resources for these MBS multicast sessions to upper layers.

##### 5.3.5.6.2 SRB release

The UE shall:

1> if *srb3-ToRelease* is included:

2> release the PDCP entity and the *srb-Identity* of the SRB3;

1> if *srb4-ToRelease* is included

2> release the PDCP entity and the *srb-Identity* of the SRB4.

##### 5.3.5.6.3 SRB addition/modification

The UE shall:

1> If any DAPS bearer is configured, for each SRB:

2> establish a PDCP entity for the target cell group as specified in TS 38.323 [5], with the same configuration as the PDCP entity for the source cell group;

2> if the *masterKeyUpdate* is received:

3> configure the PDCP entity with the security algorithms according to securityConfig and apply the keys (KRRCenc and KRRCint) associated with the master key (KgNB);

2> else:

3> configure the PDCP entity for the target cell group with state variables continuation as specified in TS 38.323 [5], and with the same security configuration as the PDCP entity for the source cell group;

1> for each *srb-Identity* value included in the *srb-ToAddModList* that is not part of the current UE configuration (SRB establishment or reconfiguration from E-UTRA PDCP to NR PDCP):

2> establish a PDCP entity;

2> if AS security has been activated:

3> if target RAT of handover is E-UTRA/5GC; or

3> if the UE is connected to E-UTRA/5GC:

4> if the UE is capable of E-UTRA/5GC, but not capable of NGEN-DC:

5> configure the PDCP entity with the security algorithms and keys (KRRCenc and KRRCint) configured/derived as specified in TS 36.331 [10];

4> else (i.e., UE capable of NGEN-DC):

5> configure the PDCP entity with the security algorithms according to *securityConfig* and apply the keys (KRRCenc and KRRCint) associated with the master key (KeNB) or secondary key (S-KgNB) as indicated in *keyToUse*, if applicable;

3> else (i.e., UE connected to NR or UE connected to E-UTRA/EPC):

4> configure the PDCP entity with the security algorithms according to *securityConfig* and apply the keys (KRRCenc and KRRCint) associated with the master key (KeNB/ KgNB) or secondary key (S-KgNB) as indicated in *keyToUse*, if applicable;

2> if the current UE configuration as configured by E-UTRA in TS 36.331 [10] includes an SRB identified with the same *srb-Identity* value:

3> associate the E-UTRA RLC entity and DCCH of this SRB with the NR PDCP entity;

3> release the E-UTRA PDCP entity of this SRB;

2> if the *pdcp-Config* is included:

3> configure the PDCP entity in accordance with the received *pdcp-Config*;

2> else:

3> configure the PDCP entity in accordance with the default configuration defined in 9.2.1 for the corresponding SRB;

1> if any DAPS bearer is configured, for each *srb-Identity* value included in the *srb-ToAddModList* that is part of the current UE configuration:

2> if the *pdcp-Config* is included:

3> reconfigure the PDCP entity for the target cell group in accordance with the received *pdcp-Config*;

1> else, for each *srb-Identity* value included in the *srb-ToAddModList* that is part of the current UE configuration:

2> if the *reestablishPDCP* is set:

3> if target RAT of handover is E-UTRA/5GC; or

3> if the UE is connected to E-UTRA/5GC:

4> if the UE is capable of E-UTRA/5GC, but not capable of NGEN-DC:

5> configure the PDCP entity to apply the integrity protection algorithm and KRRCint key configured/derived as specified in TS 36.331 [10], i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

5> configure the PDCP entity to apply the ciphering algorithm and KRRCenc key configured/derived as specified in TS 36.331 [10], i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

4> else (i.e., a UE capable of NGEN-DC):

5> configure the PDCP entity to apply the integrity protection algorithm and KRRCint key associated with the master key (KeNB) or secondary key (S-KgNB), as indicated in *keyToUse*, i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

5> configure the PDCP entity to apply the ciphering algorithm and KRRCenc key associated with the master key (KeNB) or secondary key (S-KgNB) as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

3> else (i.e., UE connected to NR or UE in EN-DC):

4> configure the PDCP entity to apply the integrity protection algorithm and KRRCint key associated with the master key (KeNB/KgNB) or secondary key (S-KgNB), as indicated in *keyToUse* , i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

4> configure the PDCP entity to apply the ciphering algorithm and KRRCenc key associated with the master key (KeNB/KgNB) or secondary key (S-KgNB) as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

3> re-establish the PDCP entity of this SRB as specified in TS 38.323 [5];

2> else, if the *discardOnPDCP* is set:

3> trigger the PDCP entity to perform SDU discard as specified in TS 38.323 [5];

2> if the *pdcp-Config* is included:

3> reconfigure the PDCP entity in accordance with the received *pdcp-Config*.

##### 5.3.5.6.4 DRB release

The UE shall:

1> for each *drb-Identity* value included in the *drb-ToReleaseList* that is part of the current UE configuration; or

1> for each *drb-Identity* value that is to be released as the result of full configuration according to 5.3.5.11:

2> release the PDCP entity and the *drb-Identity*;

2> if SDAP entity associated with this DRB is configured:

3> indicate the release of the DRB to SDAP entity associated with this DRB (TS 37.324 [24], clause 5.3.3);

2> if the DRB is associated with an *eps-BearerIdentity*:

3> if a new bearer is not added either with NR or E-UTRA with same *eps-BearerIdentity*:

4> indicate the release of the DRB and the *eps-BearerIdentity* of the released DRB to upper layers.

NOTE 1: The UE does not consider the message as erroneous if the *drb-ToReleaseList* includes any *drb-Identity* value that is not part of the current UE configuration.

NOTE 2: Whether or not the RLC and MAC entities associated with this PDCP entity are reset or released is determined by the *CellGroupConfig*.

##### 5.3.5.6.5 DRB addition/modification

The UE shall:

1> for each *drb-Identity* value included in the *drb-ToAddModList* that is not part of the current UE configuration (DRB establishment including the case when full configuration option is used):

2> establish a PDCP entity and configure it in accordance with the received *pdcp-Config*;

2> if the PDCP entity of this DRB is not configured with *cipheringDisabled:*

3> if target RAT of handover is E-UTRA/5GC; or

3> if the UE is connected to E-UTRA/5GC:

4> if the UE is capable of E-UTRA/5GC but not capable of NGEN-DC:

5> configure the PDCP entity with the ciphering algorithm and KUPenc key configured/derived as specified in TS 36.331 [10];

4> else (i.e., a UE capable of NGEN-DC):

5> configure the PDCP entity with the ciphering algorithms according to *securityConfig* and apply the key (KUPenc) associated with the master key (KeNB) or secondary key (S-KgNB) as indicated in *keyToUse*, if applicable;

3> else (i.e., UE connected to NR or UE connected to E-UTRA/EPC):

4> configure the PDCP entity with the ciphering algorithms according to *securityConfig* and apply the KUPenc key associated with the master key (KeNB/KgNB) or the secondary key (S-KgNB/S-KeNB) as indicated in keyToUse;

2> if the PDCP entity of this DRB is configured with *integrityProtection*:

3> configure the PDCP entity with the integrity protection algorithms according to *securityConfig* and apply the KUPint key associated with the master (KeNB/KgNB) or the secondary key (S-KgNB) as indicated in *keyToUse*;

2> if an *sdap-Config* is included:

3> if an SDAP entity with the received *pdu-Session* does not exist:

4> establish an SDAP entity as specified in TS 37.324 [24] clause 5.1.1;

4> if an SDAP entity with the received *pdu-Session* did not exist prior to receiving this reconfiguration:

5> indicate the establishment of the user plane resources for the *pdu-Session* to upper layers;

3> configure the SDAP entity in accordance with the received *sdap-Config* as specified in TS 37.324 [24] and associate the DRB with the SDAP entity;

3> for each QFI value added in *mappedQoS-FlowsToAdd*, if the QFI value is previously configured, the QFI value is released from the old DRB;

2> if the DRB is associated with an *eps-BearerIdentity*:

3> if the DRB was configured with the same *eps-BearerIdentity* either by NR or E-UTRA prior to receiving this reconfiguration:

4> associate the established DRB with the corresponding *eps-BearerIdentity;*

3> else:

4> indicate the establishment of the DRB(s) and the *eps-BearerIdentity* of the established DRB(s) to upper layers;

1> for each *drb-Identity* value included in the *drb-ToAddModList* that is part of the current UE configuration and configured as DAPS bearer:

2> reconfigure the PDCP entity to configure DAPS with the ciphering function, integrity protection function and ROHC function of the target cell group as specified in TS 38.323 [5] and configure it in accordance with the received *pdcp-Config*;

2> if the *masterKeyUpdate* is received:

3> if the ciphering function of the target cell group PDCP entity is not configured with *cipheringDisabled:*

4> configure the ciphering function of the target cell group PDCP entity with the ciphering algorithm according to *securityConfig* and apply the KUPenc key associated with the master key (KgNB), as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received from the target cell group and sent to the target cell group by the UE;

3> if the integrity protection function of the target cell group PDCP entity is configured with *integrityProtection*:

4> configure the integrity protection function of the target cell group PDCP entity with the integrity protection algorithms according to *securityConfig* and apply the KUPint key associated with the master key (KgNB) as indicated in *keyToUse*;

2> else:

3> configure the ciphering function and the integrity protection function of the target cell group PDCP entity with the same security configuration as the PDCP entity for the source cell group;

2> if the *sdap-Config* is included and when indication of successful completion of random access towards target cell is received from lower layers as specified in [3]:

3> reconfigure the SDAP entity in accordance with the received *sdap-Config* as specified in TS 37.324 [24];

3> for each QFI value added in *mappedQoS-FlowsToAdd*, if the QFI value is previously configured, the QFI value is released from the old DRB;

1> for each *drb-Identity* value included in the *drb-ToAddModList* that is part of the current UE configuration and not configured as DAPS bearer:

2> if the *reestablishPDCP* is set:

3> if target RAT of handover is E-UTRA/5GC; or

3> if the UE is connected to E-UTRA/5GC:

4> if the UE is capable of E-UTRA/5GC but not capable of NGEN-DC:

5> if the PDCP entity of this DRB is not configured with *cipheringDisabled:*

6> configure the PDCP entity with the ciphering algorithm and KUPenc key configured/derived as specified in TS 36.331 [10], clause 5.4.2.3, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received and sent by the UE;

4> else (i.e., a UE capable of NGEN-DC):

5> if the PDCP entity of this DRB is not configured with *cipheringDisabled*:

6> configure the PDCP entity with the ciphering algorithm and KUPenc key associated with the master key (KeNB) or the secondary key (S-KgNB), as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received and sent by the UE;

3> else (i.e., UE connected to NR or UE connected to E-UTRA/EPC (in EN-DC or capable of EN-DC)):

4> if the PDCP entity of this DRB is not configured with *cipheringDisabled:*

5> configure the PDCP entity with the ciphering algorithm and KUPenc key associated with the master key (KeNB/ KgNB) or the secondary key (S-KgNB/S-KeNB), as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received and sent by the UE;

4> if the PDCP entity of this DRB is configured with *integrityProtection*:

5> configure the PDCP entity with the integrity protection algorithms according to *securityConfig* and apply the KUPint key associated with the master key (KeNB/KgNB) or the secondary key (S-KgNB) as indicated in *keyToUse*;

3> if *drb-ContinueROHC* is included in *pdcp-Config*:

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

3> if *drb-ContinueEHC-DL* is included in *pdcp-Config*:

4> indicate to lower layer that *drb-ContinueEHC-DL* is configured;

3> if *drb-ContinueEHC-UL* is included in *pdcp-Config*:

4> indicate to lower layer that *drb-ContinueEHC-UL* is configured;

3> if *drb-ContinueUDC* is included in *pdcp-Config*:

4> indicate to lower layer that *drb-ContinueUDC* is configured;3> re-establish the PDCP entity of this DRB as specified in TS 38.323 [5], clause 5.1.2;

2> else, if the *recoverPDCP* is set:

3> trigger the PDCP entity of this DRB to perform data recovery as specified in TS 38.323 [5];

2> if the *pdcp-Config* is included:

3> reconfigure the PDCP entity in accordance with the received *pdcp-Config*.

2> if the *sdap-Config* is included:

3> reconfigure the SDAP entity in accordance with the received *sdap-Config* as specified in TS37.324 [24];

3> for each QFI value added in *mappedQoS-FlowsToAdd*, if the QFI value is previously configured, the QFI value is released from the old DRB;

NOTE 1: Void.

NOTE 2: When determining whether a *drb-Identity* value is part of the current UE configuration, the UE does not distinguish which *RadioBearerConfig* and *DRB-ToAddModList* that DRB was originally configured in. To re-associate a DRB with a different key (KeNB to S-KgNB,KgNB to S-KeNB, KgNB to S-KgNB, or vice versa), the network provides the *drb-Identity* value in the (target) *drb-ToAddModList* and sets the *reestablishPDCP* flag. The network does not list the *drb-Identity* in the (source) *drb-ToReleaseList*.

NOTE 3: When setting the *reestablishPDCP* flag for a radio bearer, the network ensures that the RLC receiver entities do not deliver old PDCP PDUs to the re-established PDCP entity. It does that e.g. by triggering a reconfiguration with sync of the cell group hosting the old RLC entity or by releasing the old RLC entity.

NOTE 4: In this specification, UE configuration refers to the parameters configured by NR RRC unless otherwise stated.

NOTE 5: Ciphering and integrity protection can be enabled or disabled for a DRB. The enabling/disabling of ciphering or integrity protection can be changed only by releasing and adding the DRB.

NOTE 6: In DAPS handover, the UE may perform PDCP entity re-establishment (if *reestablishPDCP* is set) or the PDCP data recovery (if *recoverPDCP* is set) for a non-DAPS bearer when indication of successful completion of random access towards target cell is received from lower layers as specified in TS 38.321 [3]. In this case, the UE suspends data transmission and reception for all non-DAPS bearers in the source MCG for duration of the DAPS handover.

##### 5.3.5.6.6 Multicast MRB release

The UE shall:

1> for each *mrb-Identity* value included in the *mrb-ToReleaseList* that is part of the current UE configuration; or

1> for each *mrb-Identity* value that is to be released as the result of full configuration according to 5.3.5.11:

2> release the PDCP entity and the *mrb-Identity*;

2> if there is no other multicast MRB configured with the same *tmgi* as configured for the released multicast MRB:

3> indicate the release of the user plane resources for the *tmgi* to upper layers.

NOTE 1: The UE does not consider the message as erroneous if the *mrb-ToReleaseList* includes any *mrb-Identity* value that is not part of the current UE configuration.

NOTE 2: Whether or not the RLC and MAC entities associated with this PDCP entity are reset or released is determined by the *CellGroupConfig*.

##### 5.3.5.6.7 Multicast MRB addition/modification

The UE shall for each element in the order of entry in the list *mrb-ToAddModList*:

1> if *mrb-Identity* value included in the *mrb-ToAddModList* is part of the UE configuration:

2> if *mrb-Identity* value included in the *mrb-ToAddModList* for which *mrb-IdentityNew* is included (multicast MRB ID change):

3> update the *mrb-Identity* to the value *mrb-IdentityNew*;

2> if the *reestablishPDCP* is set:

3> if *drb-ContinueROHC* is included in *pdcp-Config*:

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

3> if *drb-ContinueEHC-DL* is included in *pdcp-Config*:

4> indicate to lower layer that *drb-ContinueEHC-DL* is configured;

3> re-establish the PDCP entity of this multicast MRB as specified in TS 38.323 [5], clause 5.1.2;

2> else, if the *recoverPDCP* is set:

3> trigger the PDCP entity of this MRB to perform data recovery as specified in TS 38.323 [5];

2> if the *pdcp-Config* is included:

3> reconfigure the PDCP entity in accordance with the received *pdcp-Config*;

1> else if *mrb-Identity* value included in the *mrb-ToAddModList* that is not part of the UE configuration (multicast MRB establishment including the case when full configuration option is used):

2> establish a PDCP entity and configure it in accordance with the received *pdcp-Config*;

2> if the multicast MRB was configured with the same *tmgi* prior to receiving this reconfiguration message:

3> associate the established multicast MRB with the corresponding *tmgi*;

2> if an SDAP entity with the received *tmgi* does not exist:

3> establish an SDAP entity as specified in TS 37.324 [24] clause 5.1.1;

3> if an SDAP entity with the received *tmgi* did not exist prior to receiving this reconfiguration:

4> indicate the establishment of the user plane resources for the *tmgi* to upper layers.

NOTE 1: When setting the *reestablishPDCP* flag for a radio bearer, the network ensures that the RLC receiver entities do not deliver old PDCP PDUs to the re-established PDCP entity. It does that e.g. by triggering a reconfiguration with sync of the cell group hosting the old RLC entity or by releasing the old RLC entity.

NOTE 2: In this specification, UE configuration refers to the parameters configured by NR RRC unless otherwise stated.

NOTE 3: When updating the *mrb-Identity*, the network ensures new MRBs are listed at the end of the *mrb-ToAddModList* if they have the same MRB ID as in the existing UE configuration.

#### 5.3.5.7 AS Security key update

The UE shall:

1> if UE is connected to E-UTRA/EPC or E-UTRA/5GC:

2> upon reception of *sk-Counter* as specified in TS 36.331 [10]:

3> update the S-KgNB key based on the KeNB key and using the received *sk-Counter* value, as specified in TS 33.401 [30] for EN-DC, or TS 33.501 [11] for NGEN-DC;

3> derive the KRRCenc and KUPenc keys as specified in TS 33.401 [30] for EN-DC, or TS 33.501 [11] for NGEN-DC;

3> derive the KRRCint and KUPint keys as specified in TS 33.401 [30] for EN-DC or TS 33.501 [11] for NGEN-DC.

1> else if this procedure was initiated due to reception of the *masterKeyUpdate*:

2> if the *nas-Container* is included in the received *masterKeyUpdate*:

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

2> if the *keySetChangeIndicator* is set to *true*:

3> derive or update the KgNB key based on the KAMF key, as specified in TS 33.501 [11];

2> else:

3> derive or update the KgNB key based on the current KgNB key or the NH, using the *nextHopChainingCount* value indicated in the received *masterKeyUpdate*, as specified in TS 33.501 [11];

2> store the *nextHopChainingCount* value;

2> derive the keys associated with the KgNB key as follows:

3> if the *securityAlgorithmConfig* is included in *SecurityConfig*:

4> derive the KRRCenc and KUPenc keys associated with the *cipheringAlgorithm* indicated in the *securityAlgorithmConfig,* as specified in TS 33.501 [11];

4> derive the KRRCint and KUPint keys associated with the *integrityProtAlgorithm* indicated in the *securityAlgorithmConfig,* as specified in TS 33.501 [11];

3> else:

4> derive the KRRCenc and KUPenc keys associated with the current *cipheringAlgorithm,* as specified in TS 33.501 [11];

4> derive the KRRCint and KUPint keys associated with the current *integrityProtAlgorithm,* as specified in TS 33.501 [11].

NOTE 1: Ciphering and integrity protection are optional to configure for the DRBs.

1> else if this procedure was initiated due to reception of the *sk-Counter* (UE is in NE-DC, or NR-DC, or is configured with SN terminated bearer(s)):

2> derive or update the secondary key (S-KgNB or S-KeNB) based on the KgNB key and using the received *sk-Counter* value, as specified in TS 33.501 [11];

2> derive the KRRCenc key and the KUPenc key as specified in TS 33.501 [11] using the ciphering algorithms indicated in the *RadioBearerConfig* associated with the secondary key (S-KgNB or S-KeNB) as indicated by *keyToUse*;

2> derive the KRRCint key and the KUPint key as specified in TS 33.501 [11] using the integrity protection algorithms indicated in the *RadioBearerConfig* associated with the secondary key (S-KgNB or S-KeNB) as indicated by *keyToUse*;

NOTE 2: If the UE has no radio bearer configured with *keyToUse* set to *secondary* and receives the *sk-Counter* without any *RadioBearerConfig* with *keyToUse* set to *secondary*, the UE does not consider it as an invalid reconfiguration.

#### 5.3.5.8 Reconfiguration failure

##### 5.3.5.8.1 Void

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

NOTE 00: The UE behaviour specified in this clause does not apply to the fields in *ServingCellConfigCommon* that are defined in release-16 and later. The UE ignores, i.e. does not take an action on and does not store, the fields that it does not support or does not comprehend.

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> if the *RRCReconfiguration* message was received as part of *ConditionalReconfiguration*:

4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;

3> else:

4> 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 clause 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> if the *RRCReconfiguration* message was received as part of *ConditionalReconfiguration*:

4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;

3> else:

4> 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> if the *RRCReconfiguration* message was received as part of *ConditionalReconfiguration*:

4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;

3> else:

4> 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 clause 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 or if the upper layers indicate that the *nas-Container* is invalid:

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.

NOTE 0b: The compliance also covers the V2X sidelink configuration carried within an octet string, e.g. field *sl-ConfigDedicatedEUTRA*. I.e. the failure behaviour defined also applies in case the UE cannot comply with the embedded V2X sidelink configuration.

3> if the *RRCReconfiguration* message was received as part of *ConditionalReconfiguration*:

4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;

3> else:

4> 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 or multicast MRB or, for IAB, SRB2, 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 or if the upper layers indicate that the *nas-Container* is invalid:

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.

NOTE 3: It is up to UE implementation whether the compliance check for an *RRCReconfiguration* received as part of *ConditionalReconfiguration* is performed upon the reception of the message or upon CHO, CPA and CPC execution (when the message is required to be applied).

##### 5.3.5.8.3 T304 expiry (Reconfiguration with sync Failure) or T420 expiry (Path switch failure)

The UE shall:

1> if T304 of the MCG expires, or

1> if T420 expires, or,

1> if the target L2 U2N Relay UE (i.e., the UE indicated by *targetRelayUE-Identity* in the received *RRCReconfiguration* message containing *reconfigurationWithSync* indicating path switch as specified in 5.3.5.5.2) changes its serving PCell before path switch:

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

2> release dedicated msgA PUSCH resources provided in *rach-ConfigDedicated* if configured;

2> if any DAPS bearer is configured, and radio link failure is not detected in the source PCell, according to clause 5.3.10.3:

3> reset MAC for the target PCell and release the MAC configuration for the target PCell;

3> for each DAPS bearer:

4> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the target PCell;

4> reconfigure the PDCP entity to release DAPS as specified in TS 38.323 [5];

3> for each SRB:

4> if the *masterKeyUpdate* was not received:

5> configure the PDCP entity for the source PCell with state variables continuation as specified in TS 38.323 [5];

4> release the PDCP entity for the target PCell;

4> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the target PCell;

4> trigger the PDCP entity for the source PCell to perform SDU discard as specified in TS 38.323 [5];

4> re-establish the RLC entity for the source PCell;

3> release the physical channel configuration for the target PCell;

3> discard the keys used in target PCell (the KgNB key, the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key), if any;

3> resume suspended SRBs in the source PCell;

3> for each non-DAPS bearer:

4> revert back to the UE configuration used for the DRB or multicast MRB in the source PCell, includes PDCP, RLC states variables, the security configuration and the data stored in transmission and reception buffers in PDCP and RLC entities ;

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

3> store the handover failure information in *VarRLF-Report* as described in the clause 5.3.10.5;

3> initiate the failure information procedure as specified in clause 5.7.5 to report DAPS handover failure.

2> else:

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

3> if the associated T304 was not initiated upon cell selection performed while timer T311 was running, as defined in clause 5.3.7.3:

4> store the handover failure information in *VarRLF-Report* as described in the clause 5.3.10.5;

3> initiate the connection re-establishment procedure as specified in clause 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 clause 5.7.3 to report SCG reconfiguration with sync failure, upon which the RRC reconfiguration procedure ends;

2> else:

3> if the UE is in NR-DC:

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

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.

NOTE 2: In this clause, the term 'handover failure' has been used to refer to 'reconfiguration with sync failure'.

#### 5.3.5.9 Other configuration

The UE shall:

1> if the received *otherConfig* includes the *delayBudgetReportingConfig*:

2> if *delayBudgetReportingConfig* is set to *setup*:

3> consider itself to be configured to send delay budget reports in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to send delay budget reports and stop timer T342, if running.

1> if the received *otherConfig* includes the *overheatingAssistanceConfig*:

2> if *overheatingAssistanceConfig* is set to *setup*:

3> consider itself to be configured to provide overheating assistance information in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide overheating assistance information and stop timer T345, if running;

1> if the received *otherConfig* includes the *idc-AssistanceConfig*:

2> if *idc-AssistanceConfig* is set to *setup*:

3> consider itself to be configured to provide IDC assistance information in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide IDC assistance information;

1> if the received *otherConfig* includes the *drx-PreferenceConfig*:

2> if *drx-PreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on DRX parameters for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on DRX parameters for power saving for the cell group and stop timer T346a associated with the cell group, if running;

1> if the received *otherConfig* includes the *maxBW-PreferenceConfig*:

2> if *maxBW-PreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the maximum aggregated bandwidth for power saving for the cell group in accordance with 5.7.4;

3> if *otherConfig* includes *maxBW-PreferenceConfigFR2-2*:

4> consider itself to be configured to provide its preference on the maximum aggregated bandwidth for FR2-2 for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the maximum aggregated bandwidth for power saving for the cell group and stop timer T346b associated with the cell group, if running;

1> if the received *otherConfig* includes the *maxCC-PreferenceConfig*:

2> if *maxCC-PreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the maximum number of secondary component carriers for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the maximum number of secondary component carriers for power saving for the cell group and stop timer T346c associated with the cell group, if running;

1> if the received *otherConfig* includes the *maxMIMO-LayerPreferenceConfig*:

2> if *maxMIMO-LayerPreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the maximum number of MIMO layers for power saving for the cell group in accordance with 5.7.4;

3> if *otherConfig* includes *maxMIMO-LayerPreferenceConfigFR2-2*:

4> consider itself to be configured to provide its preference on the maximum number of MIMO layers for FR2-2 for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the maximum number of MIMO layers for power saving for the cell group and stop timer T346d associated with the cell group, if running;

1> if the received *otherConfig* includes the *minSchedulingOffsetPreferenceConfig*:

2> if *minSchedulingOffsetPreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its preference on the minimum scheduling offset for cross-slot scheduling for power saving for the cell group in accordance with 5.7.4;

3> if *otherConfig* includes *minSchedulingOffsetPreferenceConfigExt*:

4> consider itself to be configured to provide its preference on the minimum scheduling offset for 480 kHz SCS and/or 960 kHz SCS for cross-slot scheduling for power saving for the cell group in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its preference on the minimum scheduling offset for cross-slot scheduling for power saving for the cell group and stop timer T346e associated with the cell group, if running;

1> if the received *otherConfig* includes the *releasePreferenceConfig*:

2> if *releasePreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide assistance information to transition out of RRC\_CONNECTED in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide assistance information to transition out of RRC\_CONNECTED and stop timer T346f, if running.

1> if the received *otherConfig* includes the *obtainCommonLocation*:

2> include available detailed location information for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

NOTE 1: The UE is requested to attempt to have valid detailed location information available whenever sending a measurement report for which it is configured to include available detailed location information. The UE may not succeed e.g. because the user manually disabled the GPS hardware, due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.

1> if the received *otherConfig* includes the *btNameList*:

2> if *btNameList* is set to *setup*, include available Bluetooth measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

1> if the received *otherConfig* includes the *wlanNameList*:

2> if *wlanNameList* is set to *setup*, include available WLAN measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

1> if the received *otherConfig* includes the *sensorNameList*:

2> if *sensorNameList* is set to *setup*, include available Sensor measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;

NOTE 2: The UE is requested to attempt to have valid Bluetooth measurements, WLAN measurements and Sensor measurements whenever sending a measurement report for which it is configured to include these measurements. The UE may not succeed e.g. because the user manually disabled the WLAN or Bluetooth or Sensor hardware. Further details, e.g. regarding when to activate WLAN or Bluetooth or Sensor, are up to UE implementation.

1> if the received *otherConfig* includes the *sl-AssistanceConfigNR*:

2> consider itself to be configured to provide configured grant assistance information for NR sidelink communication in accordance with 5.7.4;

1> if the received *otherConfig* includes the *referenceTimePreferenceReporting*:

2> consider itself to be configured to provide UE reference time assistance information in accordance with 5.7.4;

1> else:

2> consider itself not to be configured to provide UE reference time assistance information;

1> if the received *otherConfig* includes the *successHO-Config*:

2> consider itself to be configured to provide the successful handover information in accordance with 5.7.10.6;

1> else:

2> consider itself not to be configured to provide the successful handover information.

1> if the received *otherConfig* includes the *ul-GapFR2-PreferenceConfig*:

2> consider itself to be configured to provide its preference on FR2 UL gap in accordance with 5.7.4;

1> else:

2> consider itself not to be configured to provide its preference on FR2 UL gap;

1> if the received *otherConfig* includes the *musim-GapAssistanceConfig*:

2> if *musim-GapAssistanceConfig* is set to *setup*:

3> consider itself to be configured to provide MUSIM assistance information for gap preference in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide MUSIM assistance information for gap preference and stop timer T346h, if running;

1> if the received *otherConfig* includes the *musim-LeaveAssistanceConfig:*

2> if *musim-LeaveAssistanceConfig* is set to *setup*:

3> consider itself to be configured to provide MUSIM assistance information for leaving RRC\_CONNECTED in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide MUSIM assistance information for leaving RRC\_CONNECTED and stop timer T346g, if running.

1> if the received *otherConfig* includes the *rlm-RelaxationReportingConfig*:

2> if *rlm-RelaxationReportingConfig* is set to *setup*:

3> consider itself to be configured to report the relaxation state of RLM measurements in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to report the relaxation state of RLM measurements and stop timer T346j associated with the cell group, if running;

1> if the received *otherConfig* includes the *bfd-RelaxationReportingConfig*:

2> if *bfd-RelaxationReportingConfig* is set to *setup*:

3> consider itself to be configured to report the relaxation state of BFD measurements in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to report the relaxation state of BFD measurements and stop timer T346k associated with the cell group, if running;

1> if the received *otherConfig* includes the *scg-DeactivationPreferenceConfig*:

2> if the *scg-DeactivationPreferenceConfig* is set to *setup*:

3> consider itself to be configured to provide its SCG deactivation preference in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide its SCG deactivation preference and stop timer T346i, if running.

1> if the received *otherConfig* includes the *propDelayDiffReportConfig*:

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

3> consider itself to be configured to provide service link propagation delay difference between serving cell and neighbour cell(s) in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to provide service link propagation delay difference between serving cell and neighbour cell(s).

1> if the received *otherConfig* includes the *rrm-MeasRelaxationReportingConfig*:

2> if the *rrm-MeasRelaxationReportingConfig* is set to *setup*:

3> consider itself to be configured to report the fulfilment of the criterion for relaxing RRM measurements in accordance with 5.7.4;

2> else:

3> consider itself not to be configured to report the fulfilment of the criterion for relaxing RRM measurements.

#### 5.3.5.10 MR-DC release

The UE shall:

1> as a result of MR-DC release triggered by E-UTRA or NR:

2> release SRB3, if established, as specified in 5.3.5.6.2;

2> release *measConfig* associated with SCG;

2> if the UE is configured with NR SCG:

3> release the SCG configuration as specified in clause 5.3.5.4;

3> release *otherConfig* associated with the SCG, if configured;

3> stop timers T346a, T346b, T346c, T346d, T346e, T346j and T346k associated with the SCG, if running;

3> release *bap-Config* associated with the SCG, if configured;

3> release the BAP entity as specified in TS 38.340 [47], if there is no configured *bap-Config*;

3> release *iab-IP-AddressConfigurationList* associated with the SCG, if configured;

2> else if the UE is configured with E-UTRA SCG:

3> release the SCG configuration as specified in TS 36.331 [10], clause 5.3.10.19 to release the E-UTRA SCG;

#### 5.3.5.11 Full configuration

The UE shall:

1> release/ clear all current dedicated radio configurations except for the following:

- the MCG C-RNTI;

- the AS security configurations associated with the master key;

- the SRB1/SRB2 configurations and DRB/multicast MRB configurations as configured by *radioBearerConfig* or *radioBearerConfig2*.

NOTE 1: Radio configuration is not just the resource configuration but includes other configurations like *MeasConfig*. Radio configuration also includes the RLC bearer configurations as configured by *RLC-BearerConfig*. In case NR-DC or NE-DC is configured, this also includes the entire NR or E-UTRA SCG configuration which are released according to the MR-DC release procedure as specified in 5.3.5.10.

NOTE 1a: For NR sidelink communication/discovery, the radio configuration includes the sidelink RRC configuration received from the network, but does not include the sidelink RRC reconfiguration and sidelink UE capability received from other UEs via PC5-RRC. In addition, the UE considers the new NR sidelink configurations as full configuration, in case of state transition and change of system information used for NR sidelink communication/discovery.

NOTE 1b: To establish the RLC bearer of SRB(s) after release due to *fullConfig*, the network can include the *srb-Identity* within *srb-ToAddModList* (i.e. the UE applies RLC default configuration) and/or provide *rlc-BearerToAddModList* of concerned SRB(s) explicitly.

- the logged measurement configuration;

1> if the *spCellConfig* in the *masterCellGroup* includes the *reconfigurationWithSync*:

2> release/ clear all current common radio configurations;

2> use the default values specified in 9.2.3 for timers T310, T311 and constants N310, N311;

1> else (full configuration after re-establishment or during RRC resume):

2> if the UE is acting as L2 U2N Remote UE:

3> use value for timer T311, as included in *ue-TimersAndConstants* received in *SIB1*

2> else:

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

1> if no *measConfigAppLayerId* is included:

2> inform upper layers about the release of all application layer measurement configurations;

2> discard any received application layer measurement report from upper layers;

2> consider itself not to be configured to send application layer measurement report.

1> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the following:

- parameters for which values are provided in *SIB1*;

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

1> for each *srb-Identity* value included in the *srb-ToAddModList* (SRB reconfiguration):

2> establish an RLC entity for the corresponding SRB;

2> apply the default SRB configuration defined in 9.2.1 for the corresponding SRB;

NOTE 2: This is to get the SRBs (SRB1 and SRB2 for reconfiguration with sync and SRB2 for resume and reconfiguration after re-establishment) to a known state from which the reconfiguration message can do further configuration.

1> for each *pdu-Session* that is part of the current UE configuration:

2> release the SDAP entity (clause 5.1.2 in TS 37.324 [24]);

2> release each DRB associated to the *pdu-Session* as specified in 5.3.5.6.4;

NOTE 3: This will retain the *pdu-Session* but remove the DRBs including *drb-identity* of these bearers from the current UE configuration. Setup of the DRBs within the AS is described in clause 5.3.5.6.5 using the new configuration. The *pdu-Session* acts as the anchor for associating the released and re-setup DRB. In the AS the DRB re-setup is equivalent with a new DRB setup (including new PDCP and logical channel configurations).

1> for each *tmgi* that is part of the current UE configuration:

2> release the SDAP entity (clause 5.1.2 in TS 37.324 [24]);

2> release each multicast MRB associated to the *tmgi* as specified in 5.3.5.6.6;

NOTE 4: This will retain the *tmgi* but remove the multicast MRBs including *mrb-identity* of these bearers from the current UE configuration. Setup of the multicast MRBs within the AS is described in clause 5.3.5.6.7 using the new configuration. The *tmgi* acts as the anchor for associating the released and re-setup multicast MRB. In the AS the multicast MRB re-setup is equivalent with a new multicast MRB setup (including new PDCP and logical channel configurations).

1> for each *pdu-Session* that is part of the current UE configuration but not added with same *pdu-Session* in the *drb-ToAddModList*:

2> if the procedure was triggered due to reconfiguration with sync:

3> indicate the release of the user plane resources for the *pdu-Session* to upper layers after successful reconfiguration with sync;

2> else:

3> indicate the release of the user plane resources for the *pdu-Session* to upper layers immediately;

1> for each *tmgi* that is part of the current UE configuration but not added with the same *tmgi* in the *mrb-ToAddModList*:

2> if the procedure was triggered due to reconfiguration with sync:

3> indicate the release of the user plane resources for the *tmgi* to upper layers after successful reconfiguration with sync;

2> else:

3> indicate the release of the user plane resources for the *tmgi* to upper layers immediately.

#### 5.3.5.12 BAP configuration

The IAB-MT shall:

1> if the *bap-Config* is set to *setup*:

2> if no BAP entity is established:

3> establish a BAP entity as specified in TS 38.340 [47];

2> if *bap-address* is included:

3> configure the BAP entity to use the *bap-Address* as this node's BAP address;

2> if *defaultUL-BAP-RoutingID* is included:

3> configure the BAP entity to apply the default UL BAP routing ID according to the configuration;

2> if *defaultUL-BH-RLC-Channel* is included

3> configure the BAP entity to apply the default UL BH RLC channel according to the configuration;

2> if *flowControlFeedbackType* is included:

3> configure the BAP entity to apply the flow control feedback according to the configuration;

1> if the *bap-Config* is set to *release*, and if there is no other configured *bap-Config* for the MCG or for the SCG:

2> release the BAP entity as specified in TS 38.340 [47].

#### 5.3.5.12a IAB Other Configuration

##### 5.3.5.12a.1 IP address management

###### 5.3.5.12a.1.1 IP Address Release

The IAB-MT shall:

1> if the release is triggered by reception of the *iab-IP-AddressToReleaseList*:

2> for each *iab-IP-AddressIndex* value included in *iab-IP-AddressToReleaseList*:

3> release the corresponding *IAB-IP-AddressConfiguration*.

###### 5.3.5.12a.1.2 IP Address Addition/Modification

The IAB-MT shall:

1> for each *iab-IP-AddressIndex* value included in the *iab-IP-AddressToAddModList* that is not part of the current IAB-MT configuration:

2> add the IP address indicated in *iab-IP-Address*, corresponding to the *iab-IP-AddressIndex.*

2> if added IP address is *iPv4-Address*:

3> if *iab-IP-Usage* is set to *f1-C:*

4> store the received IPv4 address for F1-C traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else if *iab-IP-Usage* is set to *f1-U*:

4> store the received IPv4 address for F1-U traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else if *iab-IP-Usage* is set to *non-F1*:

4> store the received IPv4 address for non-F1 traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else:

4> store the received IPv4 address for all traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

2> else if *iPv6-Address* is included:

3> if *iab-IP-Usage* is set to *f1-C*:

4> store the received IPv6 address for F1-C traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else if *iab-IP-Usage* is set to *f1-U*:

4> store the received IPv6 address for F1-U traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else if *iab-IP-Usage* is set to *non-F1*:

4> store the received IPv6 address for non-F1 traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else:

4> store the received IPv6 address for all traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

2> else if *iPv6-Prefix* is included in *iab-IP-AddressToAddModList*:

3> if *iab-IP-Usage* is set to *f1-C*:

4> store the received IPv6 address prefix for F1-C traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else if *iab-IP-Usage* is set to *f1-U*:

4> store the received IPv6 address prefix for F1-U traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else if *iab-IP-Usage* is set to *non-F1*:

4> store the received IPv6 address prefix for non-F1 traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

3> else:

4> store the received IPv6 address prefix for all traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.

1> for each *iab-IP-AddressIndex* value included in the *iab-IP-AddressToAddModList* that is part of the current IAB-MT configuration:

2> modify the IP address configuration(s) in accordance with the *IAB-IP-AddressConfiguration* corresponding to the *iab-IP-AddressIndex.*

#### 5.3.5.13 Conditional Reconfiguration

##### 5.3.5.13.1 General

The network configures the UE with one or more candidate target SpCells in the conditional reconfiguration. The UE evaluates the condition of each configured candidate target SpCell. The UE applies the conditional reconfiguration associated with one of the target SpCells which fulfils associated execution condition. The network provides the configuration parameters for the target SpCell in the *ConditionalReconfiguration* IE.

The UE performs the following actions based on a received *ConditionalReconfiguration* IE:

1> if the *ConditionalReconfiguration* contains the *condReconfigToRemoveList*:

2> perform conditional reconfiguration removal procedure as specified in 5.3.5.13.2;

1> if the *ConditionalReconfiguration* contains the *condReconfigToAddModList*:

2> perform conditional reconfiguration addition/modification as specified in 5.3.5.13.3;

##### 5.3.5.13.2 Conditional reconfiguration removal

The UE shall:

1> for each *condReconfigId* value included in the *condReconfigToRemoveList* that is part of the current UE conditional reconfiguration in *VarConditionalReconfig*:

2> remove the entry with the matching *condReconfigId* from the *VarConditionalReconfig*;

NOTE: The UE does not consider the message as erroneous if the *condReconfigToRemoveList* includes any cond*ReconfigId* value that is not part of the current UE configuration.

##### 5.3.5.13.3 Conditional reconfiguration addition/modification

For each *condReconfigId* received in the *condReconfigToAddModList* IE the UE shall:

1> if an entry with the matching *condReconfigId* exists in the *condReconfigToAddModList* within the *VarConditionalReconfig*:

2> if the entry in *condReconfigToAddModList* includes an *condExecutionCond* or *condExecutionCondSCG*;

3> replace *condExecutionCond* or *condExecutionCondSCG* within the *VarConditionalReconfig* with the value received for this *condReconfigId*;

2> if the entry in *condReconfigToAddModList* includes an *condRRCReconfig*;

3> replace *condRRCReconfig* within the *VarConditionalReconfig* with the value received for this *condReconfigId*;

1> else:

2> add a new entry for this *condReconfigId* within the *VarConditionalReconfig*;

1> perform conditional reconfiguration evaluation as specified in 5.3.5.13.4;

##### 5.3.5.13.4 Conditional reconfiguration evaluation

The UE shall:

1> for each *condReconfigId* within the *VarConditionalReconfig*:

2> if the *RRCReconfiguration* within *condRRCReconfig* includes the *masterCellGroup* including the *reconfigurationWithSync*:

3> consider the cell which has a physical cell identity matching the value indicated in the *ServingCellConfigCommon* included in the *reconfigurationWithSync* within the *masterCellGroup* in the received *condRRCReconfig* to be applicable cell;

2> else if the *RRCReconfiguration* within *condRRCReconfig* includes the *secondaryCellGroup* including the *reconfigurationWithSync*:

3> consider the cell which has a physical cell identity matching the value indicated in the *ServingCellConfigCommon* included in the *reconfigurationWithSync* within the *secondaryCellGroup* within the received *condRRCReconfig* to be applicable cell;

2> if *condExecutionCondSCG* is configured:

3> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCondSCG* as a *measId* in the *VarMeasConfig* associated with the SCG *measConfig*;

2> if *condExecutionCond* is configured:

3> if it is configured via SRB3 or configured within *nr-SCG* or within *nr-SecondaryCellGroupConfig* (specified in TS 36.331[10]) via SRB1:

4> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCond* as a *measId* in the *VarMeasConfig* associated with the SCG *measConfig*;

3> else:

4> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCond* as a *measId* in the *VarMeasConfig* associated with the MCG *measConfig*;

2> for each *measId* included in the *measIdList* within *VarMeasConfig* indicated in the *condExecutionCond* or *condExecutionCondSCG* associated to *condReconfigId:*

3> if the *condEventId* is associated with *condEventT1*, and if the entry condition applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cell; or

3> if the *condEventId* is associated with *condEventD1*, and if the entry condition(s) applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cell during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*; or

3> if the *condEventId* is associated with *condEventA3*, *condEventA4* or *condEventA5*, and if the entry condition(s) applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*:

4> consider the event associated to that *measId* to be fulfilled;

3> if the *measId* for this event associated with the *condReconfigId* has been modified; or

3> if the *condEventId* is associated with *condEventT1*, and if the leaving condition applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cell; or

3> if the *condEventId* is associated with *condEventD1*, and if the leaving condition(s) applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cells during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*; or

3> if the *condEventId* is associated with *condEventA3*, *condEventA4* or *condEventA5*, and if the leaving condition(s) applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*:

4> consider the event associated to that *measId* to be not fulfilled;

2> if event(s) associated to all *measId*(s) within *condTriggerConfig* for a target candidate cell within the stored *condRRCReconfig* are fulfilled:

3> consider the target candidate cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;

3> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5;

NOTE 1: Up to 2 *MeasId* can be configured for each *condReconfigId.* The conditional reconfiguration event of the 2 *MeasId* may have the same or different event conditions, triggering quantity, time to trigger, and triggering threshold.

NOTE 2: If multiple NR cells are triggered in conditional reconfiguration execution, it is up to UE implementation which one to select, e.g. the UE considers beams and beam quality to select one of the triggered cells for execution.

##### 5.3.5.13.4a Conditional reconfiguration evaluation of SN initiated inter-SN CPC for EN-DC

The UE shall:

1> for each *condReconfigurationId* within the *VarConditionalReconfiguration* specified in TS 36.331[10]:

2> for each *measId* included in the *measIdList* within *VarMeasConfig* indicated in the *CondReconfigExecCondSCG* contained in the *triggerConditionSN* associated to the *condReconfigurationId* as specified in TS 36.331[10]:

3> if the entry condition(s) applicable for the event associated with that *measId*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event associated with that *measId*:

4> consider this event to be fulfilled;

3> if the *measId* for this event has been modified; or

3> if the leaving condition(s) applicable for this event associated with that *measId*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event associated with that *measId*:

4> consider this event associated to that *measId* to be not fulfilled;

2> if trigger conditions for all events associated with the *measId(s)* indicated in the *CondReconfigExecCondSCG* contained in the *triggerConditionSN* as specified in TS 36.331[10]), are fulfilled:

3> consider the target cell candidate within the *RRCReconfiguration* message contained in *nr-SecondaryCellGroupConfig* in the *RRCConnectionReconfiguration* message, as specified in TS 36.331[10], contained in the stored *condReconfigurationToApply*, associated to that *condReconfigurationId* as specified in TS 36.331[10]), clause 5.3.5.9.4, as a triggered cell;

3> initiate the conditional reconfiguration execution, as specified in TS 36.331[10]), clause 5.3.5.9.5;

NOTE: If multiple NR cells are triggered in conditional reconfiguration execution, it is up to UE implementation which one to select, e.g. the UE considers beams and beam quality to select one of the triggered cells for execution.

##### 5.3.5.13.5 Conditional reconfiguration execution

The UE shall:

1> if more than one triggered cell exists:

2> select one of the triggered cells as the selected cell for conditional reconfiguration execution;

1> else:

2> consider the triggered cell as the selected cell for conditional reconfiguration execution;

1> for the selected cell of conditional reconfiguration execution:

2> apply the stored *condRRCReconfig* of the selected cell and perform the actions as specified in 5.3.5.3;

NOTE: If multiple NR cells are triggered in conditional reconfiguration execution, it is up to UE implementation which one to select, e.g. the UE considers beams and beam quality to select one of the triggered cells for execution.

#### 5.3.5.13a SCG activation

Upon initiating the procedure, the UE shall:

1> if the UE is configured with an SCG after receiving the message for which this procedure is initiated:

2> if the UE was configured with a deactivated SCG before receiving the message for which this procedure is initiated:

3> consider the SCG to be activated;

3> resume performing radio link monitoring on the SCG, if previously stopped;

3> indicate to lower layers to resume beam failure detection on the PSCell, if previously stopped;

3> indicate to lower layers that the SCG is activated.

#### 5.3.5.13b SCG deactivation

Upon initiating the procedure, the UE shall:

1> consider the SCG to be deactivated;

1> indicate to lower layers that the SCG is deactivated;

1> if *bfd-and-RLM* is configured to *true*:

2> perform radio link monitoring on the SCG;

2> indicate to lower layers to perform beam failure detection on the PSCell;

1> else:

2> stop radio link monitoring on the SCG;

2> indicate to lower layers to stop beam failure detection on the PSCell;

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

2> stop timer T312 for this cell group, if running;

2> reset the counters N310 and N311;

1> if the UE was in RRC\_CONNECTED and the SCG was activated before receiving the message for which this procedure is initiated:

2> if SRB3 was configured before the reception of the *RRCReconfiguration* or of the *RRCConnectionReconfiguration* and SRB3 is not to be released according to any *RadioBearerConfig* included in the *RRCReconfiguration* or in the *RRCConnectionReconfiguration* as specified in TS 36.331[10]:

3> trigger the PDCP entity of SRB3 to perform SDU discard as specified in TS 38.323 [5];

3> re-establish the RLC entity of SRB3 as specified in TS 38.322 [4].

#### 5.3.5.13b1 SCG activation without SN message

Upon initiating the procedure, the UE shall:

1> if the SCG was deactivated before the reception of the *RRCReconfiguration* message or the E-UTRA *RRCConnectionReconfiguration* message for which the procedure invoking this clause is executed:

2> consider the SCG to be activated;

2> indicate to lower layers that the SCG is activated;

2> if *bfd-and-RLM* was not configured to true before the reception of the *RRCReconfiguration* message or the E-UTRA *RRCConnectionReconfiguration* message for which the procedure invoking this clause is executed; or

2> if lower layers indicate that a Random Access procedure is needed for SCG activation:

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

#### 5.3.5.13c FR2 UL gap configuration

The UE shall:

1> if *ul-GapFR2-Config* is set to setup:

2> if an FR2 UL gap configuration is already setup, release the FR2 UL gap configuration;

2> setup the FR2 UL gap configuration indicated by the *ul-GapFR2-Config* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

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

if the UGRP is larger than 5ms:

subframe = *gapOffset* mod 10;

else:

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

with T = CEIL(UGRP/10).

1> else if *ul-GapFR2-Config* is set to release:

2> release the FR2 UL gap configuration.

NOTE 1: For *ul-GapFR2-Config* configuration with synchronous CA, the SFN and subframe of a serving cell on FR2 frequency is used in the gap calculation. For *ul-GapFR2-Config* configuration with asynchronous CA, the SFN and subframe of a serving cell on FR2 frequency indicated by the *refFR2-ServCellAsyncCA* in *ul-GapFR2-Config* is used in the gap calculation.

#### 5.3.5.13d Application layer measurement configuration

The UE shall:

1> if *measConfigAppLayerToReleaseList* is included in *appLayerMeasConfig* within *RRCReconfiguration* or *RRCResume*:

2> for each *measConfigAppLayerId* value included in the *measConfigAppLayerToReleaseList*:

3> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration including any RAN visible application layer measurement configuration;

3> discard any application layer measurement report received from upper layers;

3> consider itself not to be configured to send application layer measurement report for the *measConfigAppLayerId*.

1> if *measConfigAppLayerToAddModList* is included in *appLayerMeasConfig* within *RRCReconfiguration* or *RRCResume*:

2> for each *measConfigAppLayerId* value included in the *measConfigAppLayerToAddModList*:

3> if *measConfigAppLayerContainer* is included for the corresponding *MeasConfigAppLayer* configuration:

4> forward the *measConfigAppLayerContainer*, the *measConfigAppLayerId* and the *serviceType* to upper layers considering the *serviceType*;

3> consider itself to be configured to send application layer measurement report for the *measConfigAppLayerId* in accordance with 5.7.16;

3> forward the *transmissionOfSessionStartStop*, if configured, and *measConfigAppLayerId* to upper layers considering the *serviceType*;

3> if *ran-VisibleParameters* is set to setup and the parameters have been received:

4> forward the *measConfigAppLayerId,* the *ran-VisiblePeriodicity*, if configured, the *numberOfBufferLevelEntries*, if configured, and the *reportPlayoutDelayForMediaStartup*, if configured, to upper layers considering the *serviceType*;

3> else if *ran-VisibleParameters* is set to release:

4> forward the *measConfigAppLayerId* and inform upper layers about the release of the RAN visible application layer measurement configuration;

3> if *pauseReporting* is set to *true*:

4> if at least one segment, but not all segments, of a segmented *MeasurementReportAppLayer* message containing an application layer measurement report associated with the *measConfigAppLayerId* has been submitted to lower layers for transmission:

5> submit the remaining segments of the *MeasurementReportAppLayer* message to lower layers for transmission;

4> suspend submitting application layer measurement report containers to lower layers for the application layer measurement configuration associated with the *measConfigAppLayerId*;

4> store any previously or subsequently received application layer measurement report containers associated with the *measConfigAppLayerId* for which no segment, or full message, has been submitted to lower layers for transmission;

3> else if *pauseReporting* is set to *false* and if transmission of application layer measurement report containers has previously been suspended for the application layer measurement configuration associated with the *measConfigAppLayerId*:

4> submit stored application layer measurement report containers to lower layers, if any, for the application layer measurements configuration associated with the *measConfigAppLayerId;*

4> resume submitting application layer measurement report containers to lower layers for the application layer measurement configuration associated with the *measConfigAppLayerId*;

NOTE 1: The UE may discard reports when the memory reserved for storing application layer measurement reports becomes full.

NOTE 2: The transmission of RAN visible application layer measurement reports is not paused when *pauseReporting* is set to *true*.

#### 5.3.5.14 Sidelink dedicated configuration

Upon initiating the procedure, the UE shall:

1> if *sl-FreqInfoToReleaseList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> for each entry included in the received *sl-FreqInfoToReleaseList* that is part of the current UE configuration:

3> release the related configurations from the stored NR sidelink communication/discovery configurations;

1> if *sl-FreqInfoToAddModList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> if configured to receive NR sidelink communication:

3> use the resource pool(s) indicated by *sl-RxPool* for NR sidelink communication reception, as specified in 5.8.7;

2> if configured to transmit NR sidelink communication:

3> use the resource pool(s) indicated by *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* for NR sidelink communication transmission, as specified in 5.8.8;

2> if configured to receive NR sidelink discovery:

3> use the resource pool(s) indicated by *sl-DiscRxPool* or *sl-RxPool* for NR sidelink discovery reception, as specified in 5.8.13.2;

2> if configured to transmit NR sidelink discovery:

3> use the resource pool(s) indicated by *sl-DiscTxPoolSelected*, *sl-DiscTxPoolScheduling*, *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* for NR sidelink discovery transmission, as specified in 5.8.13.3;

2> perform CBR measurement on the transmission resource pool(s) indicated by *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling*, *sl-DiscTxPoolSelected, sl-DiscTxPoolScheduling* or *sl-TxPoolExceptional* for NR sidelink communication/discovery transmission, as specified in 5.5.3;

2> use the synchronization configuration parameters for NR sidelink communication/discovery on frequencies included in *sl-FreqInfoToAddModList*, as specified in 5.8.5;

1> if *sl-RadioBearerToReleaseList* or *sl-RLC-BearerToReleaseList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> perform sidelink DRB release as specified in 5.8.9.1a.1;

1> if *sl-RadioBearerToAddModList* or *sl-RLC-BearerToAddModList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> perform sidelink DRB addition/modification as specified in 5.8.9.1a.2;

1> if *sl-ScheduledConfig* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> configure the MAC entity parameters, which are to be used for NR sidelink communication/discovery, in accordance with the received *sl-ScheduledConfig*;

1> if *sl-UE-SelectedConfig* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> configure the parameters, which are to be used for NR sidelink communication/discovery, in accordance with the received *sl-UE-SelectedConfig*;

1> if *sl-MeasConfigInfoToReleaseList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> for each *SL-DestinationIndex* included in the received *sl-MeasConfigInfoToReleaseList* that is part of the current UE configuration:

3> remove the entry with the matching *SL-DestinationIndex* from the stored NR sidelink measurement configuration information;

1> if *sl-MeasConfigInfoToAddModList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> for each *sl-DestinationIndex* included in the received *sl-MeasConfigInfoToAddModList* that is part of the current stored NR sidelink measurement configuration:

3> reconfigure the entry according to the value received for this *sl-DestinationIndex* from the stored NR sidelink measurement configuration information;

2> for each *sl-DestinationIndex* included in the received *sl-MeasConfigInfoToAddModList* that is not part of the current stored NR sidelink measurement configuration:

3> add a new entry for this *sl-DestinationIndex* to the stored NR sidelink measurement configuration.

1> if *sl-DRX-ConfigUC-ToReleaseList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> for each *SL-DestinationIndex* included in the received *sl-DRX-ConfigUC-ToReleaseList* that is part of the current UE configuration:

3> remove the entry with the matching *SL-DestinationIndex* from the stored NR sidelink DRX configuration information;

1> if *sl-DRX-ConfigUC-ToAddModList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> for each *sl-DestinationIndex* included in the received *sl-DRX-ConfigUC-ToAddModList* that is part of the current stored NR sidelink DRX configuration:

3> reconfigure the entry according to the value received for this *sl-DestinationIndex* from the stored NR sidelink DRX configuration information;

2> for each *sl-DestinationIndex* included in the received *sl-DRX-ConfigUC-ToAddModList* that is not part of the current stored NR sidelink DRX configuration:

3> add a new entry for this *sl-DestinationIndex* to the stored NR sidelink DRX configuration.

1> if *sl-RLC-ChannelToReleaseList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> perform PC5 Relay RLC channel release as specified in 5.8.9.7.1;

1> if *sl-RLC-ChannelToAddModList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

2> perform PC5 Relay RLC channel addition/modification as specified in 5.8.9.7.2;

#### 5.3.5.15 L2 U2N Relay UE configuration

##### 5.3.5.15.1 General

The network configures the L2 U2N Relay UE with relay operation related configurations. For each connected L2 U2N Remote UE indicated in *sl-L2IdentityRemote*, the network provides the configuration parameters used for relaying.

The UE performs the following actions based on a received *sl-L2RelayUE-Config*:

1> if the *sl-L2RelayUE-Config* contains the *sl-RemoteUE-ToReleaseList*:

2> perform the L2 U2N Remote UE release as specified in 5.3.5.15.2;

1> if the *sl-L2RelayUE-Config* contains the *sl-RemoteUE-ToAddModList*:

2> perform the L2 U2N Remote UE addition/modification as specified in 5.3.5.15.3;

##### 5.3.5.15.2 L2 U2N Remote UE Release

The L2 U2N Relay UE shall:

1> if the release is triggered by reception of the *sl-RemoteUE-ToReleaseList*:

2> for each *SL-DestinationIdentity* value included in the *sl-RemoteUE-ToReleaseList*:

3> if the current UE has a PC5 RRC connection to a L2 U2N Remote UE with *SL-DestinationIdentity*:

4> perform the PC5-RRC connection release as specified in 5.8.9.5.

##### 5.3.5.15.3 L2 U2N Remote UE Addition/Modification

The L2 U2N Relay UE shall:

1> if no SRAP entity has been established:

2> establish a SRAP entity as specified in TS 38.351 [66];

1> for each *sl-L2IdentityRemote* value included in the *sl-RemoteUE-ToAddModList* that is not part of the current UE configuration (L2 U2N Remote UE Addition):

2> configure the parameters to SRAP entity in accordance with the *sl-SRAP-Config-Relay*;

2> if SRB1 is included in *sl-MappingToAddModList*, and no dedicated PC5 Relay RLC channel configuration associated with SRB1 included in the same *RRCReconfiguration* message,

3> apply the default configuration of SL-RLC1 as specified in clause 9.2.4 for the SRB1;

1> for each *sl-L2IdentityRemote* value included in the *sl-RemoteUE-ToAddModList* that is part of the current UE configuration (L2 U2N Remote UE modification):

2> modify the configuration in accordance with the *sl-SRAP-Config-Relay*;

#### 5.3.5.16 L2 U2N Remote UE configuration

The network configures the L2 U2N Remote UE with relay operation related configurations, e.g. SRAP configuration.

The UE performs the following actions:

1> if the *sl-L2RemoteUE-Config* contains the *sl-SRAP-ConfigRemote:*

2> if no SRAP entity has been established:

3> establish a SRAP entity as specified in TS 38.351 [66];

2> configure the parameters to SRAP entity in accordance with the *sl-SRAP-ConfigRemote*;

1> if the *sl-L2RemoteUE-Config* contains the *sl-UEIdentityRemote:*

2> use the value of the *sl-UEIdentityRemote* as the C-RNTI in the PCell.

|  |
| --- |
| NEXT CHANGE |

### 5.3.7 RRC connection re-establishment

#### 5.3.7.1 General



Figure 5.3.7.1-1: RRC connection re-establishment, successful



Figure 5.3.7.1-2: RRC re-establishment, fallback to RRC establishment, successful

The purpose of this procedure is to re-establish the RRC connection. A UE in RRC\_CONNECTED, for which AS security has been activated with SRB2 and at least one DRB/multicast MRB setup or, for IAB, SRB2, may initiate the procedure in order to continue the RRC connection. The connection re-establishment succeeds if the network is able to find and verify a valid UE context or, if the UE context cannot be retrieved, and the network responds with an *RRCSetup* according to clause 5.3.3.4.

The network applies the procedure e.g as follows:

- When AS security has been activated and the network retrieves or verifies the UE context:

- to re-activate AS security without changing algorithms;

- to re-establish and resume the SRB1;

- When UE is re-establishing an RRC connection, and the network is not able to retrieve or verify the UE context:

- to discard the stored AS Context and release all RBs and BH RLC channels and Uu Relay RLC channels;

- to fallback to establish a new RRC connection.

If AS security has not been activated, the UE shall not initiate the procedure but instead moves to RRC\_IDLE directly, with release cause 'other'. If AS security has been activated, but SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, are not setup, the UE does not initiate the procedure but instead moves to RRC\_IDLE directly, with release cause 'RRC connection failure'.

#### 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 *t316* is not configured, in accordance with 5.3.10; or

1> upon detecting radio link failure of the MCG while SCG transmission is suspended, in accordance with 5.3.10; or

1> upon detecting radio link failure of the MCG while PSCell change or PSCell addition is ongoing, in accordance with 5.3.10; or

1> upon detecting radio link failure of the MCG while the SCG is deactivated, in accordance with 5.3.10; or

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

1> upon mobility from NR failure, in accordance with 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 clause 5.3.5.8.2; or

1> upon detecting radio link failure for the SCG while MCG transmission is suspended, in accordance with clause 5.3.10.3 in NR-DC or in accordance with TS 36.331 [10] clause 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 clause 5.3.5.8.3; or

1> upon SCG change failure while MCG transmission is suspended in accordance with TS 36.331 [10] clause 5.3.5.7a; or

1> upon SCG configuration failure while MCG transmission is suspended in accordance with clause 5.3.5.8.2 in NR-DC or in accordance with TS 36.331 [10] clause 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 clause 5.7.3b.5; or

1> upon detecting sidelink radio link failure by L2 U2N Remote UE in RRC\_CONNECTED, in accordance with clause 5.8.9.3; or

1> upon reception of *NotificationMessageSidelink* including *indicationType* by L2 U2N Remote UE in RRC\_CONNECTED, in accordance with clause 5.8.9.10; or

1> upon PC5 unicast link release indicated by upper layer at L2 U2N Remote UE in RRC\_CONNECTED.

Upon initiation of the procedure, the UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> stop timer T304, if running;

1> start timer T311;

1> stop timer T316, if running;

1> if UE is not configured with *attemptCondReconfig*:

2> reset MAC;

2> release *spCellConfig*, if configured;

2> suspend all RBs, and BH RLC channels for IAB-MT, and Uu Relay RLC channels for L2 U2N Relay UE, except SRB0 and broadcast MRBs;

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

2> if MR-DC is configured:

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

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

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

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

2> release *btNameList*, if configured;

2> release *wlanNameList*, if configured;

2> release *sensorNameList*, if configured;

2> release *drx-PreferenceConfig* for the MCG, if configured and stop timer T346a associated with the MCG, if running;

2> release *maxBW-PreferenceConfig* for the MCG, if configured and stop timer T346b associated with the MCG, if running;

2> release *maxCC-PreferenceConfig* for the MCG, if configured and stop timer T346c associated with the MCG, if running;

2> release *maxMIMO-LayerPreferenceConfig* for the MCG, if configured and stop timer T346d associated with the MCG, if running;

2> release *minSchedulingOffsetPreferenceConfig* for the MCG, if configured stop timer T346e associated with the MCG, if running;

2> release *rlm-RelaxationReportingConfig* for the MCG, if configured and stop timer T346j associated with the MCG, if running;

2> release *bfd-RelaxationReportingConfig* for the MCG, if configured and stop timer T346k associated with the MCG, if running;

2> release *releasePreferenceConfig*, if configured stop timer T346f, if running;

2> release *onDemandSIB-Request* if configured, and stop timer T350, if running;

2> release *referenceTimePreferenceReporting*, if configured;

2> release *sl-AssistanceConfigNR*, if configured;

2> release *obtainCommonLocation*, if configured;

2> release *musim-GapAssistanceConfig*, if configured and stop timer T346h, if running;

2> release *musim-LeaveAssistanceConfig*, if configured;

2> release*ul-GapFR2-PreferenceConfig*, if configured;

2> release *scg-DeactivationPreferenceConfig*, if configured, and stop timer T346i, if running;

2> release *propDelayDiffReportConfig*, if configured;

2> release *rrm-MeasRelaxationReportingConfig*, if configured;

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

1> if any DAPS bearer is configured:

2> reset the source MAC and release the source MAC configuration;

2> for each DAPS bearer:

3> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;

3> reconfigure the PDCP entity to release DAPS as specified in TS 38.323 [5];

2> for each SRB:

3> release the PDCP entity for the source SpCell;

3> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;

2> release the physical channel configuration for the source SpCell;

2> discard the keys used in the source SpCell (the KgNB key, the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key), if any;

1> release *sl-L2RelayUE-Config*, if configured;

1> release *sl-L2RemoteUE-Config*, if configured;

1> release the SRAP entity, if configured;

1> if the UE is acting as L2 U2N Remote UE:

2> if the PC5-RRC connection with the U2N Relay UE is determined to be released:

3> perform the PC5-RRC connection release as specified in 5.8.9.5;

3> perform either cell selection in accordance with the cell selection process as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;

2> else (i.e., maintain the PC5 RRC connection):

3> consider the connected L2 U2N Relay UE as suitable and perform actions as specified in clause 5.3.7.3a;

NOTE 1: It is up to Remote UE implementation whether to release or keep the current PC5 unicast link.

1> else:

2> perform cell selection in accordance with the cell selection process as specified in TS 38.304 [20].

NOTE 2: For L2 U2N Remote UE, if both a suitable cell and a suitable relay are available, the UE can select either one based on its implementation.

#### 5.3.7.3 Actions following cell selection while T311 is running

Upon selecting a suitable NR cell, the UE shall:

1> ensure having valid and up to date essential system information as specified in clause 5.2.2.2;

1> stop timer T311;

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> stop the relay (re)selection procedure, if ongoing;

1> if the cell selection is triggered by detecting radio link failure of the MCG or re-configuration with sync failure of the MCG or mobility from NR failure, and

1> if *attemptCondReconfig* is configured; and

1> if the selected cell is not configured with *CondEventT1*, or the selected cell is configured with *CondEventT1* and leaving condition has not been fulfilled; and

1> if the selected cell is one of the candidate cells for which the *reconfigurationWithSync* is included in the *masterCellGroup* in *VarConditionalReconfig*:

2> if the UE supports RLF-Report for conditional handover, set the *choCellId* in the *VarRLF-Report* to the global cell identity, if available, otherwise to the physical cell identity and carrier frequency of the selected cell;

2> apply the stored *condRRCReconfig* associated to the selected cell and perform actions as specified in 5.3.5.3;

NOTE 1: It is left to network implementation to how to avoid keystream reuse in case of CHO based recovery after a failed handover without key change.

1> else:

2> if UE is configured with *attemptCondReconfig*:

3> reset MAC;

3> release *spCellConfig*, if configured;

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

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

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

3> if MR-DC is configured:

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

3> release *idc-AssistanceConfig*, if configured;

3> release *btNameList*, if configured;

3> release *wlanNameList*, if configured;

3> release *sensorNameList*, if configured;

3> release *drx-PreferenceConfig* for the MCG, if configured and stop timer T346a associated with the MCG, if running;

3> release *maxBW-PreferenceConfig* for the MCG, if configured and stop timer T346b associated with the MCG, if running;

3> release *maxCC-PreferenceConfig* for the MCG, if configured and stop timer T346c associated with the MCG, if running;

3> release *maxMIMO-LayerPreferenceConfig* for the MCG, if configured and stop timer T346d associated with the MCG, if running;

3> release *minSchedulingOffsetPreferenceConfig* for the MCG, if configured and stop timer T346e associated with the MCG, if running;

3> release *rlm-RelaxationReportingConfig* for the MCG, if configured and stop timer T346j associated with the MCG, if running;

3> release *bfd-RelaxationReportingConfig* for the MCG, if configured and stop timer T346k associated with the MCG, if running;

3> release *releasePreferenceConfig*, if configured and stop timer T346f, if running;

3> release *onDemandSIB-Request* if configured, and stop timer T350, if running;

3> release referenceTimePreferenceReporting, if configured;

3> release *sl-AssistanceConfigNR*, if configured;

3> release *obtainCommonLocation*, if configured;

3> release *scg-DeactivationPreferenceConfig*, if configured, and stop timer T346i, if running;

3> release *musim-GapAssistanceConfig*, if configured and stop timer T346h, if running;

3> release *musim-LeaveAssistanceConfig*, if configured;

3> release *propDelayDiffReportConfig*, if configured;

3> release *ul-GapFR2-PreferenceConfig*, if configured;

3> release *rrm-MeasRelaxationReportingConfig*, if configured;

3> suspend all RBs, and BH RLC channels for the IAB-MT, except SRB0;

2> remove all the entries within *VarConditionalReconfig*, if any;

2> for each *measId*, if the associated *reportConfig* has a *reportType* set to *condTriggerConfig*:

3> for the associated *reportConfigId*:

4> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;

3> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:

4> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;

3> remove the entry with the matching *measId* from the *measIdList* within the *VarMeasConfig*;

2> start timer T301;

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

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

2> apply the CCCH configuration as specified in 9.1.1.2;

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

2> initiate transmission of the *RRCReestablishmentRequest* message in accordance with 5.3.7.4;

NOTE 2: This procedure applies also if the UE returns to the source PCell.

Upon selecting an inter-RAT cell, the UE shall:

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

#### 5.3.7.3a Actions following relay selection while T311 is running

Upon selecting a suitable L2 U2N Relay UE, the L2 U2N Remote UE shall:

1> ensure having valid and up to date essential system information as specified in clause 5.2.2.2;

1> stop timer T311;

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> stop the cell (re)selection procedure, if ongoing;

1> start timer T301;

1> apply the specified configuration of SL-RLC0 as specified in 9.1.1.4;

1> apply the SDAP configuration and PDCP configuration as specified in 9.1.1.2 for SRB0;

1> initiate transmission of the *RRCReestablishmentRequest* message in accordance with 5.3.7.4.

#### 5.3.7.4 Actions related to transmission of *RRCReestablishmentRequest* message

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

1> if the procedure was initiated due to radio link failure as specified in 5.3.10.3 or reconfiguration with sync failure as specified in 5.3.5.8.3:

2> set the *reestablishmentCellId* in the *VarRLF-Report* to the global cell identity of the selected cell;

1> set the *ue-Identity* as follows:

2> set the *c-RNTI* to the C-RNTI used in the source PCell (reconfiguration with sync or mobility from NR failure) or used in the PCell in which the trigger for the re-establishment occurred (other cases);

2> set the *physCellId* to the physical cell identity of the source PCell (reconfiguration with sync or mobility from NR failure) or of the PCell in which the trigger for the re-establishment occurred (other cases);

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

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

3> with the KRRCint key and integrity protection algorithm that was used in the source PCell (reconfiguration with sync or mobility from NR failure) or of the PCell in which the trigger for the re-establishment occurred (other cases); and

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

1> set the *reestablishmentCause* as follows:

2> if the re-establishment procedure was initiated due to reconfiguration failure as specified in 5.3.5.8.2:

3> set the *reestablishmentCause* to the value *reconfigurationFailure*;

2> else if the re-establishment procedure was initiated due to reconfiguration with sync failure as specified in 5.3.5.8.3 (intra-NR handover failure) or 5.4.3.5 (inter-RAT mobility from NR failure):

3> set the *reestablishmentCause* to the value *handoverFailure*;

2> else:

3> set the *reestablishmentCause* to the value *otherFailure*;

1> re-establish PDCP for SRB1;

1> if the UE is acting as L2 U2N Remote UE:

2> establish or re-established (e.g. via release and add) SL RLC entity for SRB1;

2> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;

2> apply the default configuration of PDCP as defined in 9.2.1 for SRB1;

2> establish the SRAP entity and apply the default configuration of SRAP as defined in 9.2.5 for SRB1;

1> else:

2> re-establish RLC for SRB1;

2> apply the default configuration defined in 9.2.1 for SRB1;

1> configure lower layers to suspend integrity protection and ciphering for SRB1;

NOTE: Ciphering is not applied for the subsequent *RRCReestablishment* message used to resume the connection. An integrity check is performed by lower layers, but merely upon request from RRC.

1> resume SRB1;

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

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

The UE shall:

1> stop timer T301;

1> consider the current cell to be the PCell;

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

1> store the *nextHopChainingCount* value indicated in the *RRCReestablishment* message;

1> derive the KRRCenc and KUPenc keys associated with the previously configured *cipheringAlgorithm,* as specified in TS 33.501 [11];

1> derive the KRRCint and KUPint keys associated with the previously configured *integrityProtAlgorithm,* as specified in TS 33.501 [11].

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

1> if the integrity protection check of the *RRCReestablishment* message fails:

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

1> configure lower layers to resume integrity protection for SRB1 using the previously configured algorithm and the KRRCint key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> configure lower layers to resume ciphering for SRB1 using the previously configured algorithm and, the KRRCenc key immediately, i.e., ciphering shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> release the measurement gap configuration indicated by the *measGapConfig*, if configured;

1> release the MUSIM gap configuration indicated by the *musim-GapConfig*, if configured;

1> if *ta-Report* is configured with value *enabled* and the UE supports TA reporting;

2> indicate TA report initiation to lower layers;

1> release the FR2 UL gap configuration indicated by the *ul-GapFR2-Config*, if configured;

1> perform the L2 U2N Remote UE configuration procedure in accordance with the received *sl-L2RemoteUE-Config* as specified in 5.3.5.16;

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

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

3> include the *logMeasAvailable* in the *RRCReestablishmentComplete* message;

3> if Bluetooth measurement results are included in the logged measurements the UE has available for NR:

4> include the *logMeasAvailableBT* in the *RRCReestablishmentComplete* message;

3> if WLAN measurement results are included in the logged measurements the UE has available for NR:

4> include the *logMeasAvailableWLAN* in the *RRCReestablishmentComplete* message;

2> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:

3> if T330 timer is running and the logged measurements configuration is for NR:

4> set *sigLogMeasConfigAvailable* to *true* in the *RRCReestablishmentComplete* message;

3> else:

4> if the UE has logged measurements available for NR:

5> set *sigLogMeasConfigAvailable* to *false* in the *RRCReestablishmentComplete* message;

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

3> include *connEstFailInfoAvailable* in the *RRCReestablishmentComplete* message;

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

2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:

3> include *rlf-InfoAvailable* in the *RRCReestablishmentComplete* message;

2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:

3> include *successHO-InfoAvailable* in the *RRCReestablishmentComplete* message;

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

1> the procedure ends.

#### 5.3.7.6 T311 expiry

Upon T311 expiry, the UE shall:

1> if the procedure was initiated due to radio link failure or handover failure:

2> set the *noSuitableCellFound* in the *VarRLF-Report* to *true*;

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

#### 5.3.7.7 T301 expiry or selected cell/L2 U2N Relay UE no longer suitable

The UE shall:

1> if timer T301 expires; or

1> if the selected cell becomes no longer suitable according to the cell selection criteria as specified in TS 38.304 [20]; or

1> if the (re)selected L2 U2N Relay UE becomes unsuitable; or

1> upon receiption of *NotificationMessageSidelink* indicating *relayUE-HO* or *relayUE-CellReselection*:

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

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

The UE shall:

1> perform the RRC connection establishment procedure as specified in 5.3.3.4.

### 5.3.8 RRC connection release

#### 5.3.8.1 General



Figure 5.3.8.1-1: RRC connection release, successful

The purpose of this procedure is:

- to release the RRC connection, which includes the release of the established radio bearers (except for broadcast MRBs), BH RLC channels, Uu Relay RLC channels, PC5 Relay RLC channels as well as all radio resources; or

- to suspend the RRC connection only if SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, are setup, which includes the suspension of the established radio bearers (except for broadcast MRBs).

#### 5.3.8.2 Initiation

The network initiates the RRC connection release procedure to transit a UE in RRC\_CONNECTED to RRC\_IDLE; or to transit a UE in RRC\_CONNECTED to RRC\_INACTIVE only if SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, is setup in RRC\_CONNECTED; or to transit a UE in RRC\_INACTIVE back to RRC\_INACTIVE when the UE tries to resume (for resuming a suspended RRC connection or for initiating SDT); or to transit a UE in RRC\_INACTIVE to RRC\_IDLE when the UE tries to resume (for resuming of a suspended RRC connection or for initiating SDT). The procedure can also be used to release and redirect a UE to another frequency.

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

The UE shall:

1> delay the following actions defined in this 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> if timer T316 is running;

2> stop timer T316;

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

1> stop timer T350, if running;

1> stop timer T346g, 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 1: 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.

2> if *voiceFallbackIndication* is included:

3> consider the RRC connection release was for EPS fallback for IMS voice (see TS 23.502 [43]);

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 and the UE supports RRC connection release with deprioritisation:

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

2> store the *deprioritisationReq* until T325 expiry;

NOTE 1a: The UE stores the deprioritisation request irrespective of any cell reselection absolute priority assignments (by dedicated or common signalling) and regardless of RRC connections in NR or other RATs unless specified otherwise.

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

2> if T331 is running:

3> stop timer T331;

3> perform the actions as specified in 5.7.8.3;

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

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

3> start timer T331 with the value set to *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*;

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

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

2> apply the received *suspendConfig* except the received *nextHopChainingCount*;

2> if the *sdt-Config* is configured:

3> for each of the DRB in the *sdt-DRB-List*:

4> consider the DRB to be configured for SDT;

3> if *sdt-SRB2-Indication* is configured:

4> consider the SRB2 to be configured for SDT;

3> for each RLC bearer that is not suspended:

4> re-establish the RLC entity as specified in TS 38.322 [4];

3> for SRB2 (if it is resumed) and for SRB1:

4> trigger the PDCP entity to perform SDU discard as specified in TS 38.323 [5];

3> if *sdt-MAC-PHY-CG-Config* is configured:

4> configure the PCell with the configured grant resources for SDT and instruct the MAC entity to start the *cg-SDT-TimeAlignmentTimer*;

2> if *srs-PosRRC-Inactive* is configured:

3> apply the configuration and instruct MAC to start the *inactivePosSRS-TimeAlignmentTimer*;

2> remove all the entries within *VarConditionalReconfig*, if any;

2> for each *measId* of the MCG *measConfig* and for each *measId* of the SCG *measConfig*, if configured, if the associated *reportConfig* has a *reportType* set to *condTriggerConfig*:

3> for the associated *reportConfigId*:

4> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;

3> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:

4> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;

3> remove the entry with the matching *measId* from the *measIdList* within the *VarMeasConfig*;

2> if the UE is acting as L2 U2N Remote UE:

3> establish or re-establish (e.g. via release and add) SL RLC entity for SRB1;

2> else:

3> 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> if timer T319a is running:

5> replace the stored *sdt-Config* with the one received in the *RRCRelease* message;

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

4> replace the *nextHopChainingCount* with the value of *nextHopChainingCount* received in the *RRCRelease* message*;*

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

4> if the *suspendConfig* contains the *sl-UEIdentityRemote* (i.e. the UE is a L2 U2N Remote UE):

5> replace the C-RNTI with the value of the *sl-UEIdentityRemote*;

5> replace the physical cell identitywith the value of the *sl-PhysCellId* in *sl-ServingCellInfo* contained in the discovery message received from the connected L2 U2N Relay UE;

4> else:

5> replace the C-RNTI with the C-RNTI used in the cell (see TS 38.321 [3]) the UE has received the *RRCRelease* message;

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

3> replace the *nextHopChainingCount* with the value associated with the current KgNB;

3> stop the timer T319a if running;

2> else:

3> store in the UE Inactive AS Context the *nextHopChainingCount* received in the *RRCRelease* message*,* the current KgNB and KRRCint keys, the ROHC state, the stored QoS flow to DRB mapping rules, the application layer measurement configuration, the C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell, the *spCellConfigCommon* within *ReconfigurationWithSync* of the NR PSCell (if configured) and all other parameters configured except for:

- parameters within *ReconfigurationWithSync* of the PCell;

- parameters within *ReconfigurationWithSync* of the NR PSCell, if configured;

- parameters within *MobilityControlInfoSCG* of the E-UTRA PSCell, if configured;

- *servingCellConfigCommonSIB*;

- *sl-L2RelayUE-Config*, if configured;

- *sl-L2RemoteUE-Config*, if configured;

3> store any previously or subsequently received application layer measurement reports for which no segment, or full message, has been submitted to lower layers for transmission;

NOTE 2: NR sidelink communication/discovery related configurations and logged measurement configuration are not stored as UE Inactive AS Context, when UE enters RRC\_INACTIVE.

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

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

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'.

#### 5.3.8.4 T320 expiry

The UE shall:

1> if T320 expires:

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

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

#### 5.3.8.5 UE actions upon the expiry of *DataInactivityTimer*

Upon receiving the expiry of *DataInactivityTimer* from lower layers while in RRC\_CONNECTED, the UE shall:

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

#### 5.3.8.6 T346g expiry

The UE shall:

1> if T346g expires:

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

|  |
| --- |
| NEXT CHANGE |

### 5.3.13 RRC connection resume

#### 5.3.13.1 General



Figure 5.3.13.1-1: RRC connection resume, successful



Figure 5.3.13.1-2: RRC connection resume fallback to RRC connection establishment, successful



Figure 5.3.13.1-3: RRC connection resume followed by network release, successful



Figure 5.3.13.1-4: RRC connection resume followed by network suspend, successful



Figure 5.3.13.1-5: RRC connection resume, network reject

The purpose of this procedure is to resume a suspended RRC connection, including resuming SRB(s), DRB(s) and multicast MRB(s) or perform an RNA update. This procedure is also used to initiate SDT in RRC\_INACTIVE.

#### 5.3.13.1a Conditions for resuming RRC Connection for NR sidelink communication/discovery/V2X sidelink communication

For NR sidelink communication/discovery an RRC connection is resumed only in the following cases:

1> if configured by upper layers to transmit NR sidelink communication/discovery and related data is available for transmission:

2> if the frequency on which the UE is configured to transmit NR sidelink communication is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-TxPoolSelectedNormal* for the concerned frequency; or

2> if the frequency on which the UE is configured to transmit NR sidelink discovery is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-DiscTxPoolSelected* or *sl-TxPoolSelectedNormal* for the concerned frequency;

For L2 U2N Relay UE in RRC\_INACTIVE, an RRC connection establishment is resumed in the following cases:

1> if any message is received from the L2 U2N Remote UE via SL-RLC0 as specified in 9.1.1.4 or SL-RLC1 as specified in 9.2.4;

For V2X sidelink communication an RRC connection resume is initiated only when the conditions specified for V2X sidelink communication in clause 5.3.3.1a of TS 36.331 [10] are met.

NOTE: Upper layers initiate an RRC connection resume (except if the RRC connection resume is initiated at the L2 U2N Relay UE upon reception of a message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1). The interaction with NAS is left to UE implementation.

#### 5.3.13.1b Conditions for initiating SDT

A UE in RRC\_INACTIVE initiates the resume procedure for SDT when all of the following conditions are fulfilled:

1> the upper layers request resumption of RRC connection; and

1> *SIB1* includes *sdt-ConfigCommon*; and

1> *sdt-Config* is configured; and

1> all the pending data in UL is mapped to the radio bearers configured for SDT; and

1> lower layers indicate that conditions for initiating SDT as specified in TS 38.321 [3] are fulfilled.

NOTE: How the UE determines that all pending data in UL is mapped to radio bearers configured for SDT is left to UE implementation.

#### 5.3.13.2 Initiation

The UE initiates the procedure when upper layers or AS (when responding to RAN paging, upon triggering RNA updates while the UE is in RRC\_INACTIVE, for NR sidelink communication/discovery/V2X sidelink communication as specified in clause 5.3.13.1a) requests the resume of a suspended RRC connection or requests the resume for initiating SDT as specified in clause 5.3.13.1b.

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> if the resumption occurs after release with redirect with *mpsPriorityIndication*:

3> set the resumeCause to mps-PriorityAccess;

2> else:

3> 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 1: 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;

NOTE 2: In case the L2 U2N Relay UE initiates RRC connection resume triggered by reception of message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1 as specified in 5.3.13.1a, the L2 U2N Relay UE sets the *resumeCause* by implementation, but it can only set the *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* as *resumeCause*, if the same cause value in the message received from the L2 U2N Remote UE via SL-RLC0.

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> if the UE is acting as L2 U2N Remote UE:

2> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;

2> apply the default PDCP configuration as defined in 9.2.1 for SRB1;

2> establish the SRAP entity (if needed) and apply the default configuration of SRAP as defined in 9.2.5 for SRB1;

1> else:

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

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

2> 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> release *idc-AssistanceConfig* from the UE Inactive AS context, if stored;

1> release *drx-PreferenceConfig* for all configured cell groups from the UE Inactive AS context, if stored;

1> stop all instances of timer T346a, if running;

1> release *maxBW-PreferenceConfig* for all configured cell groups from the UE Inactive AS context, if stored;

1> stop all instances of timer T346b, if running;

1> release *maxCC-PreferenceConfig* for all configured cell groups from the UE Inactive AS context, if stored;

1> stop all instances of timer T346c, if running;

1> release *maxMIMO-LayerPreferenceConfig* for all configured cell groups from the UE Inactive AS context, if stored;

1> stop all instances of timer T346d, if running;

1> release *minSchedulingOffsetPreferenceConfig* for all configured cell groups from the UE Inactive AS context, if stored;

1> stop all instances of timer T346e, if running;

1> release *rlm-RelaxationReportingConfig* for all configured cell groups from the UE Inactive AS context, if stored;

1> stop all instances of timer T346j, if running;

1> release *bfd-RelaxationReportingConfig* for all configured cell groups from the UE Inactive AS context, if stored;

1> stop all instances of timer T346k, if running;

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

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

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

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

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

1> stop timer T346f, if running;

1> stop timer T346i, if running;

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

1> release *sl-AssistanceConfigNR* from the UE Inactive AS context, if stored;

1> release *musim-GapAssistanceConfig* from the UE Inactive AS context, if stored and stop timer T346h, if running;

1> release *musim-GapConfig* from the UE Inactive AS context, if stored;

1> release *musim-LeaveAssistanceConfig* from the UE Inactive AS context, if stored;

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

1> release *ul-GapFR2-PreferenceConfig*, if configured;

1> release *rrm-MeasRelaxationReportingConfig* from the UE Inactive AS context, if stored;

1> if the UE is acting as L2 U2N Remote UE:

2> apply the specified configuration of SL-RLC0 used for the delivery of RRC message over SRB0 as specified in 9.1.1.4;

2> apply the SDAP configuration and PDCP configuration as specified in 9.1.1.2 for SRB0;

1> else:

2> apply the CCCH configuration as specified in 9.1.1.2;

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

1> if *sdt-MAC-PHY-CG-Config* is configured:

2> if the resume procedure is initiated in a cell that is different to the PCell in which the UE received the stored *sdt-MAC-PHY-CG-Config*:

3> release the stored *sdt-MAC-PHY-CG-Config*;

3> instruct the MAC entity to stop the *cg-SDT-TimeAlignmentTimer*, if it is running;

1> if conditions for initiating SDT in accordance with 5.3.13.1b are fulfilled:

2> consider the resume procedure is initiated for SDT;

2> start timer T319a when the lower layers first transmit the CCCH message;

1> else:

2> start timer T319;

2> instruct the MAC entity to stop the *cg*-*SDT*-*TimeAlignmentTimer*, if it is running;

1> if *ta-Report* is configured with value *enabled* and the UE supports TA reporting

2> indicate TA report initiation to lower layers;

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

1> release *successHO-Config* from the UE Inactive AS context, if stored;

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 *nextHopChainingCount* value received in the previous *RRCRelease* message and stored in the UE Inactive AS Context, 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 and MRBs using the configured algorithm and the KRRCint key and KUPint key derived in this clause 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 MRBs and to apply the configured ciphering algorithm, the KRRCenc key and the KUPenc key derived in this clause, 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> if the resume procedure is initiated for SDT:

2> for each radio bearer that is configured for SDT and for SRB1:

3> restore the *RLC-BearerConfig* associated with the RLC bearers of *masterCellGroup* and *pdcp-Config* from the UE Inactive AS context;

3> re-establish PDCP entity for the radio bearer without triggering PDCP status report;

2> resume all the radio bearers that are configured for SDT;

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 or T319a is running, perform actions specified in 5.3.13.5.

If the UE is a RedCap UE and the initial DL BWP for RedCap is not associated with CD-SSB, the UE may continue cell re-selection related measurements as well as cell re-selection evaluation, otherwise the UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.13.6.

NOTE 3: For L2 U2N Remote UE in RRC\_INACTIVE, the cell (re)selection procedure as specified in TS 38.304 [20] and relay (re)selection procedure as specified in 5.8.15.3 are performed independently and it is up to UE implementation to select either a cell or a L2 U2N Relay UE.

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

The UE shall:

1> stop timer T319, if running;

1> stop timer T319a, if running;

1> stop timer T380, if running;

1> if T331 is running:

2> stop timer T331;

2> perform the actions as specified in 5.7.8.3;

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> 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> store the used *nextHopChainingCount* value associated to the current KgNB;

1> if *sdt-MAC-PHY-CG-Config* is configured:

2> instruct the MAC entity to stop the *cg-SDT-TimeAlignmentTimer*, if it is running;

2> instruct the MAC entity to start the *timeAlignmentTimer* associated with the PTAG*,* if it is not running;

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> if the *RRCResume* includes the *scg-State*:

4> perform SCG deactivation as specified in 5.3.5.13b;

3> else:

4> perform SCG activation as specified in 5.3.5.13a;

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*;

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> if the *RRCResume* message includes the *needForGapsConfigNR*:

2> if *needForGapsConfigNR* is set to *setup*:

3> consider itself to be configured to provide the measurement gap requirement information of NR target bands;

2> else:

3> consider itself not to be configured to provide the measurement gap requirement information of NR target bands;

1> if the *RRCResume* message includes the *needForGapNCSG-ConfigNR*:

2> if *needForGapNCSG-ConfigNR* is set to *setup*:

3> consider itself to be configured to provide the measurement gap and NCSG requirement information of NR target bands;

2> else:

3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of NR target bands;

1> if the *RRCResume* message includes the *needForGapNCSG-ConfigEUTRA*:

2> if *needForGapNCSG-ConfigEUTRA* is set to *setup*:

3> consider itself to be configured to provide the measurement gap and NCSG requirement information of E‑UTRA target bands;

2> else:

3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of E‑UTRA target bands;

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

2> perform the application layer measurement configuration procedure as specified in 5.3.5.13d;

1> if the *RRCResume* message includes the *sl-L2RemoteUE-Config* (i.e. the UE is a L2 U2N Remote UE):

2> perform the L2 U2N Remote UE configuration procedure as specified in 5.3.5.16;

1> if the *RRCResume* message includes the *sl-ConfigDedicatedNR*:

2> perform the sidelink dedicated configuration procedure as specified in 5.3.5.14;

1> resume SRB2 (if suspended), SRB3 (if configured), SRB4 (if configured), all DRBs (that are suspended) and multicast MRBs;

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> stop relay reselection procedure if any for L2 U2N Remote UE;

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 upper layers provides a PLMN:

3> if the UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:

4> set the *selectedPLMN-Identity* from the *npn-IdentityInfoList*;

3> else:

4> set the *selectedPLMN-Identity* to the PLMN selected by upper layers from the *plmn-IdentityInfoList*;

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

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

3> include *uplinkDirectCurrentBWP-SUL* for each MCG serving cell configured with SUL carrier, if any, within the *uplinkTxDirectCurrentList*;

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

3> include in the *uplinkTxDirectCurrentTwoCarrierList* the list of uplink Tx DC locations for the configured uplink carrier aggregation in the MCG;

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

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

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:

4> if the SIB1 contains *idleModeMeasurementsNR* and the UE has NR idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*; or

4> if the SIB1 contains *idleModeMeasurementsEUTRA* and the UE has E-UTRA idle/inactive measurement information available in *VarMeasIdleReport*:

5> include the *idleMeasAvailable*;

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

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

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

3> include the *logMeasAvailable* in the *RRCResumeComplete* message*;*

3> if Bluetooth measurement results are included in the logged measurements the UE has available for NR:

4> include the *logMeasAvailableBT* in the *RRCResumeComplete* message;

3> if WLAN measurement results are included in the logged measurements the UE has available for NR:

4> include the *logMeasAvailableWLAN* in the *RRCResumeComplete* message;

2> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:

3> if T330 timer is running and the logged measurements configuration is for NR:

4> set *sigLogMeasConfigAvailable* to *true* in the *RRCResumeComplete* message;

3> else:

4> if the UE has logged measurements available for NR:

5> set *sigLogMeasConfigAvailable* to false in the *RRCResumeComplete* message;

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

3> include *connEstFailInfoAvailable* in the *RRCResumeComplete* message;

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

2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:

3> include *rlf-InfoAvailable* in the *RRCResumeComplete* message;

2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:

3> include *successHO-InfoAvailable* in the *RRCResumeComplete* message;

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

3> include the *mobilityHistoryAvail* in the *RRCResumeComplete* message;

2> if *speedStateReselectionPars* is configured in the *SIB2*:

3> include the *mobilityState* in the *RRCResumeComplete* message and set it to the mobility state (as specified in TS 38.304 [20]) of the UE just prior to entering RRC\_CONNECTED state;

2> if the UE is configured to provide the measurement gap requirement information of NR target bands:

3> include the *NeedForGapsInfoNR* and set the contents as follows:

4> include *intraFreq-needForGap* and set the gap requirement information of intra-frequency measurement for each NR serving cell;

4> if *requestedTargetBandFilterNR* is configured, for each supported NR band that is also included in *requestedTargetBandFilterNR*, include an entry in *interFreq-needForGap* and set the gap requirement information for that band; otherwise, include an entry in *interFreq-needForGap* and set the corresponding gap requirement information for each supported NR band;

2> if the UE is configured to provide the measurement gap and NCSG requirement information of NR target bands:

3> include the *NeedForGapNCSG-InfoNR* and set the contents as follows:

4> include *intraFreq-needForNCSG* and set the gap and NCSG requirement information of intra-frequency measurement for each NR serving cell;

4> if *requestedTargetBandFilterNCSG-NR* is configured:

5> for each supported NR band included in *requestedTargetBandFilterNCSG-NR*, include an entry in *interFreq-needForNCSG* and set the NCSG requirement information for that band;

4> else:

5> include an entry for each supported NR band in *interFreq-needForNCSG* and set the corresponding NCSG requirement information;

2> if the UE is configured to provide the measurement gap and NCSG requirement information of E‑UTRA target bands:

3> include the *NeedForGapNCSG-InfoEUTRA* and set the contents as follows:

4> if *requestedTargetBandFilterNCSG-EUTRA* is configured:

5> for each supported E-UTRA band included in *requestedTargetBandFilterNCSG-EUTRA*, include an entry in *needForNCSG-EUTRA* and set the NCSG requirement information for that band;

4> else:

5> include an entry for each supported E-UTRA band in *needForNCSG-EUTRA* and set the corresponding NCSG requirement information;

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

1> the procedure ends.

#### 5.3.13.5 Handling of failure to resume RRC Connection

The UE shall:

1> if timer T319 expires:

2> if the UE supports multiple CEF report:

3> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-identity* stored in *VarConnEstFailReport*; and

3> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport* and if the *maxCEFReport-r17* has not been reached:

4> append the *VarConnEstFailReport* as a new entry in the *VarConnEstFailReportList*;

2> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* and if the RPLMN is not equal to *plmn-identity* stored in *VarConnEstFailReport*; or

2> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport*:

3> reset the *numberOfConnFail* to 0;

2> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReportList* and if the RPLMN is not equal to *plmn-identity* stored in *VarConnEstFailReportList*:

3> clear the content included in *VarConnEstFailReportList*;

2> clear the content included in *VarConnEstFailReport* except for the *numberOfConnFail*, if any;

2> store the following connection resume failure information in the *VarConnEstFailReport* by setting its fields as follows:

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

3> set the *measResultFailedCell* to include the global cell identity, tracking area code, the cell level and SS/PBCH block level RSRP, and RSRQ, and SS/PBCH block indexes, of the failed cell based on the available SSB measurements collected up to the moment the UE detected connection resume failure;

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

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

NOTE: The UE includes the latest results of the available measurements as used for cell reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 38.133 [14].

3> if available, set the *locationInfo* as in 5.3.3.7;

3> set *perRAInfoList* to indicate the performed random access procedure related information as specified in 5.7.10.5;

3> if *numberOfConnFail* is smaller than 8:

4> increment the *numberOfConnFail* by 1;

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

1> else if upon receiving Integrity check failure indication from lower layers while T319 or T319a is running:

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

1> else if indication from the MCG RLC that the maximum number of retransmissions has been reached is received while T319a is running; or

1> if random access problem indication is received from MCG MAC while T319a is running; or

1> if the lower layers indicate that *cg*-*SDT*-*TimeAlignmentTimer* or the *configuredGrantTimer* expired before receiving network response for the UL CG-SDT transmission with CCCH message while T319a is running; or

1> if T319a expires:

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

The UE may discard the connection resume failure or connection establishment failure information, i.e. release the UE variable *VarConnEstFailReport*, 48 hours after the last connection resume failure is detected.

The L2 U2N Relay UE either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

#### 5.3.13.6 Cell re-selection or cell selection or L2 U2N relay (re)selection while T390, T319, T319a or T302 is running (UE in RRC\_INACTIVE) or SRS transmission in RRC\_INACTIVE is configured

The UE shall:

1> if cell reselection occurs while T319 or T302 or T319a is running; or

1> if relay reselection occurs while T319 is running; or

1> if cell changes due to relay reselection while T302 is running:

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

1> else if cell selection or reselection occurs while T390 is running, or cell change due to relay selection or reselection occurs while T390 is running:

2> stop T390 for all access categories;

2> perform the actions as specified in 5.3.14.4.

1> else if cell reselection occurs when *srs-PosRRC-Inactive* is configured:

2> indicate to the lower layer to stop *inactivePosSRS-TimeAlignmentTimer*;

2> release the *srs-PosRRC-Inactive*.

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

The UE shall:

1> perform the RRC connection setup procedure as specified in 5.3.3.4.

#### 5.3.13.8 RNA update

In RRC\_INACTIVE state, the UE shall:

1> if T380 expires; or

1> if RNA Update is triggered at reception of SIB1, as specified in 5.2.2.4.2:

2> if T319a is not running:

3> initiate RRC connection resume procedure in 5.3.13.2 with *resumeCause* set to *rna-Update*;

1> if barring is alleviated for Access Category '8' or Access Category '2', as specified in 5.3.14.4:

2> if upper layers do not request RRC the resumption of an RRC connection, and

2> if the variable *pendingRNA-Update* is set to *true*:

3> initiate RRC connection resume procedure in 5.3.13.2 with *resumeCause* value set to *rna-Update*.

If the UE in RRC\_INACTIVE state fails to find a suitable cell and camps on the acceptable cell to obtain limited service as defined in TS 38.304 [20], the UE shall:

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

NOTE: It is left to UE implementation how to behave when T380 expires while the UE is camped neither on a suitable nor on an acceptable cell.

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

The UE shall:

1> perform the actions as specified in 5.3.8.

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

The UE shall:

1> perform the actions as specified in 5.3.15.

#### 5.3.13.11 Inability to comply with *RRCResume*

The UE shall:

1> if the UE is unable to comply with (part of) the configuration included in the *RRCResume* message;

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with release cause ′RRC Resume failure′.

NOTE 1: The UE may apply above failure handling also in case the *RRCResume* message causes a protocol error for which the generic error handling as defined in 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.

#### 5.3.13.12 Inter RAT cell reselection

Upon reselecting to an inter-RAT cell, the UE shall:

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

|  |
| --- |
| NEXT CHANGE |

## 5.5 Measurements

### 5.5.1 Introduction

The network may configure an RRC\_CONNECTED UE to perform measurements. The network may configure the UE to report them in accordance with the measurement configuration or perform conditional reconfiguration evaluation in accordance with the conditional reconfiguration. The measurement configuration is provided by means of dedicated signalling i.e. using the *RRCReconfiguration* or *RRCResume.*

The network may configure the UE to perform the following types of measurements:

- NR measurements;

- Inter-RAT measurements of E-UTRA frequencies;

- Inter-RAT measurements of UTRA-FDD frequencies;

- NR sidelink measurements of L2 U2N Relay UEs.

The network may configure the UE to report the following measurement information based on SS/PBCH block(s):

- Measurement results per SS/PBCH block;

- Measurement results per cell based on SS/PBCH block(s);

- SS/PBCH block(s) indexes.

The network may configure the UE to report the following measurement information based on CSI-RS resources:

- Measurement results per CSI-RS resource;

- Measurement results per cell based on CSI-RS resource(s);

- CSI-RS resource measurement identifiers.

The network may configure the UE to perform the following types of measurements for NR sidelink and V2X sidelink:

- CBR measurements.

The network may configure the UE to report the following CLI measurement information based on SRS resources:

- Measurement results per SRS resource;

- SRS resource(s) indexes.

The network may configure the UE to report the following CLI measurement information based on CLI-RSSI resources:

- Measurement results per CLI-RSSI resource;

- CLI-RSSI resource(s) indexes.

The network may configure the UE to report the following Rx-Tx time difference measurement information based on CSI-RS for tracking or PRS:

- UE Rx-Tx time difference measurement result.

The measurement configuration includes the following parameters:

**1. Measurement objects:** A list of objects on which the UE shall perform the measurements.

- For intra-frequency and inter-frequency measurements a measurement object indicates the frequency/time location and subcarrier spacing of reference signals to be measured. Associated with this measurement object, the network may configure a list of cell specific offsets, a list of 'exclude-listed' cells and a list of 'allow-listed' cells. Exclude-listed cells are not applicable in event evaluation or measurement reporting. Allow-listed cells are the only ones applicable in event evaluation or measurement reporting.

- The *measObjectId* of the MO which corresponds to each serving cell is indicated by *servingCellMO* within the serving cell configuration.

- For inter-RAT E-UTRA measurements a measurement object is a single E-UTRA carrier frequency. Associated with this E-UTRA carrier frequency, the network can configure a list of cell specific offsets and a list of 'exclude-listed' cells. Exclude-listed cells are not applicable in event evaluation or measurement reporting.

- For inter-RAT UTRA-FDD measurements a measurement object is a set of cells on a single UTRA-FDD carrier frequency.

- For NR sidelink measurements of L2 U2N Relay UEs, a measurement object is a single NR sidelink frequency to be measured.

- For CBR measurement of NR sidelink communication, a measurement object is a set of transmission resource pool(s) on a single carrier frequency for NR sidelink communication.

- For CBR measurement of NR sidelink discovery, a measurement object is a set of discovery dedicated resource pool(s) or transmission resource pool(s) also used for NR sidelink discovery on a single carrier frequency for NR sidelink discovery.

- For CLI measurements a measurement object indicates the frequency/time location of SRS resources and/or CLI-RSSI resources, and subcarrier spacing of SRS resources to be measured.

**2. Reporting configurations:** A list of reporting configurations where there can be one or multiple reporting configurations per measurement object. Each measurement reporting configuration consists of the following:

- Reporting criterion: The criterion that triggers the UE to send a measurement report. This can either be periodical or a single event description.

- RS type: The RS that the UE uses for beam and cell measurement results (SS/PBCH block or CSI-RS).

- Reporting format: The quantities per cell and per beam that the UE includes in the measurement report (e.g. RSRP) and other associated information such as the maximum number of cells and the maximum number beams per cell to report.

In case of conditional reconfiguration, each configuration consists of the following:

- Execution criteria: The criteria the UE uses for conditional reconfiguration execution.

- RS type: The RS that the UE uses for obtaining beam and cell measurement results (SS/PBCH block-based or CSI-RS-based), used for evaluating conditional reconfiguration execution condition.

**3. Measurement identities:** For measurement reporting, a list of measurement identities where each measurement identity links one measurement object with one reporting configuration. By configuring multiple measurement identities, it is possible to link more than one measurement object to the same reporting configuration, as well as to link more than one reporting configuration to the same measurement object. The measurement identity is also included in the measurement report that triggered the reporting, serving as a reference to the network. For conditional reconfiguration triggering, one measurement identity links to exactly one conditional reconfiguration trigger configuration. And up to 2 measurement identities can be linked to one conditional reconfiguration execution condition.

**4. Quantity configurations:** The quantity configuration defines the measurement filtering configuration used for all event evaluation and related reporting, and for periodical reporting of that measurement. For NR measurements, the network may configure up to 2 quantity configurations with a reference in the NR measurement object to the configuration that is to be used. In each configuration, different filter coefficients can be configured for different measurement quantities, for different RS types, and for measurements per cell and per beam.

**5. Measurement gaps:** Periods that the UE may use to perform measurements.

A UE in RRC\_CONNECTED maintains a measurement object list, a reporting configuration list, and a measurement identities list according to signalling and procedures in this specification. The measurement object list possibly includes NR measurement object(s), CLI measurement object(s), inter-RAT objects, and L2 U2N Relay objects. Similarly, the reporting configuration list includes NR, inter-RAT, and L2 U2N Relay reporting configurations. Any measurement object can be linked to any reporting configuration of the same RAT type. Some reporting configurations may not be linked to a measurement object. Likewise, some measurement objects may not be linked to a reporting configuration.

The measurement procedures distinguish the following types of cells:

1. The NR serving cell(s) – these are the SpCell and one or more SCells.

2. Listed cells – these are cells listed within the measurement object(s).

3. Detected cells – these are cells that are not listed within the measurement object(s) but are detected by the UE on the SSB frequency(ies) and subcarrier spacing(s) indicated by the measurement object(s).

For NR measurement object(s), the UE measures and reports on the serving cell(s)/serving Relay UE (for L2 U2N Remote UE), listed cells and/or detected cells. For inter-RAT measurements object(s) of E-UTRA, the UE measures and reports on listed cells and detected cells and, for RSSI and channel occupancy measurements, the UE measures and reports on the configured resources on the indicated frequency. For inter-RAT measurements object(s) of UTRA-FDD, the UE measures and reports on listed cells. For CLI measurement object(s), the UE measures and reports on configured measurement resources (i.e. SRS resources and/or CLI-RSSI resources). For L2 U2N Relay object(s), the UE measures and reports on the serving NR cell(s), as well as the discovered L2 U2N Relay UEs.

Whenever the procedural specification, other than contained in clause 5.5.2, refers to a field it concerns a field included in the *VarMeasConfig* unless explicitly stated otherwise i.e. only the measurement configuration procedure covers the direct UE action related to the received *measConfig*.

In NR-DC, the UE may receive two independent *measConfig*:

- a *measConfig*, associated with MCG, that is included in the *RRCReconfiguration* message received via SRB1; and

- a *measConfig*, associated with SCG, that is included in the *RRCReconfiguration* message received via SRB3, or, alternatively, included within a *RRCReconfiguration* message embedded in a *RRCReconfiguration* message received via SRB1.

In this case, the UE maintains two independent *VarMeasConfig* and *VarMeasReportList*, one associated with each *measConfig*, and independently performs all the procedures in clause 5.5 for each *measConfig* and the associated *VarMeasConfig* and *VarMeasReportList*, unless explicitly stated otherwise.

The configurations related to CBR measurements are only included in the *measConfig* associated with MCG.

The configurations related to Rx-Tx time difference measurement are only included in the *measConfig* associated with MCG.

### 5.5.2 Measurement configuration

#### 5.5.2.1 General

The network applies the procedure as follows:

- to ensure that, whenever the UE has a *measConfig* associated with a CG, it includes a *measObject* for the SpCell and for each NR SCell of the CG to be measured;

- to configure at most one measurement identity across all CGs using a reporting configuration with the *reportType* set to *reportCGI;*

- to configure at most one measurement identity per the node hosting PDCP entity using a reporting configuration with the *ul-DelayValueConfig;*

- to configure at most one measurement identity per the node hosting PDCP entity using a reporting configuration with the *ul-ExcessDelayConfig;*

-to ensure that, in the *measConfig* associated with a CG:

- for all SSB based measurements there is at most one measurement object with the same *ssbFrequency*;

*-* an *smtc1* included in any measurement object with the same *ssbFrequency* has the same value and that an *smtc2* included in any measurement object with the same *ssbFrequency* has the same value and that an *smtc3list* included in any measurement object with the same *ssbFrequency* has the same value and that an *smtc4list* included in any measurement object with the same *ssbFrequency* has the same value;

- to ensure that all measurement objects configured in this specification and in TS 36.331 [10] with the same *ssbFrequency* have the same *ssbSubcarrierSpacing*;

- to ensure that, if a measurement object associated with the MCG has the same *ssbFrequency* as a measurement object associated with the SCG:

- for that *ssbFrequency*, the measurement window according to the *smtc1* configured by the MCG includes the measurement window according to the *smtc1* configured by the SCG, or vice-versa, with an accuracy of the maximum receive timing difference specified in TS 38.133 [14].

- if both measurement objects are used for RSSI measurements, bits in *measurementSlots* in both objects corresponding to the same slot are set to the same value. Also, the *endSymbol* is the same in both objects.

- to ensure that, if a measurement object has the same *ssbFrequency* as a measurement object configured in TS 36.331 [10]:

- for that *ssbFrequency*, the measurement window according to the *smtc* configured in TS 36.331 [10] includes the measurement window according to the *smtc1* configured in TS 38.331, or vice-versa, with an accuracy of the maximum receive timing difference specified in TS 38.133 [14].

- if both measurement objects are used for RSSI measurements, bits in *measurementSlots* in both objects corresponding to the same slot are set to the same value. Also, the *endSymbol* is the same in both objects.

- when the UE is in NE-DC, NR-DC, or NR standalone, to configure at most one measurement identity across all CGs using a reporting configuration with the *reportType* set to *reportSFTD*;

For CSI-RS resources, the network applies the procedure as follows:

- to ensure that all CSI-RS resources configured in each measurement object have the same center frequency, (*startPRB*+floor(*nrofPRBs*/2))

- to ensure that the total number of CSI-RS resources configured in each measurement object does not exceed the maximum number specified in TS 38.214 [19].

The UE shall:

1> if the received *measConfig* includes the *measObjectToRemoveList*:

2> perform the measurement object removal procedure as specified in 5.5.2.4;

1> if the received *measConfig* includes the *measObjectToAddModList*:

2> perform the measurement object addition/modification procedure as specified in 5.5.2.5;

1> if the received *measConfig* includes the *reportConfigToRemoveList*:

2> perform the reporting configuration removal procedure as specified in 5.5.2.6;

1> if the received *measConfig* includes the *reportConfigToAddModList*:

2> perform the reporting configuration addition/modification procedure as specified in 5.5.2.7;

1> if the received *measConfig* includes the *quantityConfig*:

2> perform the quantity configuration procedure as specified in 5.5.2.8;

1> if the received *measConfig* includes the *measIdToRemoveList*:

2> perform the measurement identity removal procedure as specified in 5.5.2.2;

1> if the received *measConfig* includes the *measIdToAddModList*:

2> perform the measurement identity addition/modification procedure as specified in 5.5.2.3;

1> if the received *measConfig* includes the *measGapConfig*:

2> perform the measurement gap configuration procedure as specified in 5.5.2.9;

1> if the received *measConfig* includes the *measGapSharingConfig*:

2> perform the measurement gap sharing configuration procedure as specified in 5.5.2.11;

1> if the received *measConfig* includes the *s-MeasureConfig*:

2> if *s-MeasureConfig* is set to *ssb-RSRP*, set parameter *ssb-RSRP* of *s-MeasureConfig* within *VarMeasConfig* to the lowest value of the RSRP ranges indicated by the received value of *s-MeasureConfig;*

2> else, set parameter *csi-RSRP* of *s-MeasureConfig* within *VarMeasConfig* to the lowest value of the RSRP ranges indicated by the received value of *s-MeasureConfig*.

#### 5.5.2.2 Measurement identity removal

The UE shall:

1> for each *measId* included in the received *measIdToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:

2> remove the entry with the matching *measId* from the *measIdList* within the *VarMeasConfig*;

2> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;

2> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

NOTE: The UE does not consider the message as erroneous if the *measIdToRemoveList* includes any *measId* value that is not part of the current UE configuration.

#### 5.5.2.3 Measurement identity addition/modification

The network applies the procedure as follows:

- configure a *measId* only if the corresponding measurement object, the corresponding reporting configuration and the corresponding quantity configuration, are configured.

The UE shall:

1> for each *measId* included in the received *measIdToAddModList*:

2> if an entry with the matching *measId* exists in the *measIdList* within the *VarMeasConfig*:

3> replace the entry with the value received for this *measId*;

2> else:

3> add a new entry for this *measId* within the *VarMeasConfig*;

2> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;

2> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;

NOTE 1: If the *measId* associated with *reportConfig* for conditional reconfiguration is modified, the conditions are considered to be not fulfilled as specified in 5.3.5.13.4.

2> if the *reportType* is set to *reportCGI* in the *reportConfig* associated with this *measId*:

3> if the *measObject* associated with this *measId* concerns E-UTRA:

4> if the *useAutonomousGaps* is included in the *reportConfig* associated with this *measId*:

5> start timer T321 with the timer value set to 200 ms for this *measId*;

4> else:

5> start timer T321 with the timer value set to 1 second for this *measId*;

3> if the *measObject* associated with this *measId* concerns NR:

4> if the *measObject* associated with this *measId* concerns FR1:

5> if the *useAutonomousGaps* is included in the *reportConfig* associated with this *measId*:

6> if the UE is a RedCap UE with 1 Rx branch

7> start timer T321 with the timer value set to 3 seconds for this *measId*;

6> else

7> start timer T321 with the timer value set to 2 seconds for this *measId*;

5> else:

6> start timer T321 with the timer value set to 2 seconds for this *measId*;

4> if the *measObject* associated with this *measId* concerns FR2:

5> if the *useAutonomousGaps* is included in the *reportConfig* associated with this *measId*:

6> if the UE is a RedCap UE with 1 Rx branch

7> start timer T321 with the timer value set to 6 seconds for this *measId*;

6> else

7> start timer T321 with the timer value set to 5 seconds for this *measId*;

5> else:

6> start timer T321 with the timer value set to 16 seconds for this *measId*.

2> if the *reportType* is set to *reportSFTD* in the *reportConfigNR* associated with this *measId* and the *drx-SFTD-NeighMeas* is included:

3> if the *measObject* associated with this *measId* concerns FR1:

4> start timer T322 with the timer value set to 3 seconds for this *measId*;

3> if the *measObject* associated with this *measId* concerns FR2:

4> start timer T322 with the timer value set to 24 seconds for this *measId*.

#### 5.5.2.4 Measurement object removal

The UE shall:

1> for each *measObjectId* included in the received *measObjectToRemoveList* that is part of *measObjectList* in *VarMeasConfig*:

2> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;

2> remove all *measId* associated with this *measObjectId* from the *measIdList* within the *VarMeasConfig*, if any;

2> if a *measId* is removed from the *measIdList*:

3> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;

3> stop the periodical reporting timer or timer T321 or timer T322, whichever is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

NOTE: The UE does not consider the message as erroneous if the *measObjectToRemoveList* includes any *measObjectId* value that is not part of the current UE configuration.

#### 5.5.2.5 Measurement object addition/modification

The UE shall:

1> for each *measObjectId* included in the received *measObjectToAddModList*:

2> if an entry with the matching *measObjectId* exists in the *measObjectList* within the *VarMeasConfig*, for this entry:

3> reconfigure the entry with the value received for this *measObject*, except for the fields *cellsToAddModList*, *excludedCellsToAddModList*, *allowedCellsToAddModList*, *cellsToRemoveList*, *excludedCellsToRemoveList*, *allowedCellsToRemoveList*, *tx-PoolMeasToRemoveList*, *tx-PoolMeasToAddModList*, *ssb-PositionQCL-CellsToRemoveList*,and *ssb-PositionQCL-CellsToAddModList*;

3> if the received *measObject* includes the *cellsToRemoveList*:

4> for each *physCellId* included in the *cellsToRemoveList*:

5> remove the entry with the matching *physCellId* from the *cellsToAddModList*;

3> if the received *measObject* includes the *cellsToAddModList*:

4> for each *physCellId* value included in the *cellsToAddModList*:

5> if an entry with the matching *physCellId* exists in the *cellsToAddModList*:

6> replace the entry with the value received for this *physCellId*;

5> else:

6> add a new entry for the received *physCellId* to the *cellsToAddModList*;

3> if the received *measObject* includes the *excludedCellsToRemoveList*:

4> for each *pci-RangeIndex* included in the *excludedCellsToRemoveList*:

5> remove the entry with the matching *pci-RangeIndex* from the *excludedCellsToAddModList*;

NOTE 1: For each *pci-RangeIndex* included in the *excludedCellsToRemoveList* that concerns overlapping ranges of cells, a cell is removed from the exclude-list of cells only if all PCI ranges containing it are removed.

3> if the received *measObject* includes the *excludedCellsToAddModList*:

4> for each *pci-RangeIndex* included in the *excludedCellsToAddModList*:

5> if an entry with the matching *pci-RangeIndex* is included in the *excludedCellsToAddModList*:

6> replace the entry with the value received for this *pci-RangeIndex*;

5> else:

6> add a new entry for the received *pci-RangeIndex* to the *excludedCellsToAddModList*;

3> if the received *measObject* includes the *allowedCellsToRemoveList*:

4> for each *pci-RangeIndex* included in the *allowedCellsToRemoveList*:

5> remove the entry with the matching *pci-RangeIndex* from the *allowedCellsToAddModList*;

NOTE2: For each *pci-RangeIndex* included in the *allowedCellsToRemoveList* that concerns overlapping ranges of cells, a cell is removed from the allow-list of cells only if all PCI ranges containing it are removed.

3> if the received *measObject* includes the *allowedCellsToAddModList*:

4> for each *pci-RangeIndex* included in the *allowedCellsToAddModList*:

5> if an entry with the matching *pci-RangeIndex* is included in the *allowedCellsToAddModList*:

6> replace the entry with the value received for this *pci-RangeIndex*;

5> else:

6> add a new entry for the received *pci-RangeIndex* to the *allowedCellsToAddModList*

3> for each *measId* associated with this *measObjectId* in the *measIdList* within the *VarMeasConfig*, if any:

4> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;

4> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;

3> if the received *measObject* includes the *tx-PoolMeasToRemoveList*:

4> for each transmission resource pool indicated in *tx-PoolMeasToRemoveList*:

5> remove the entry with the matching identity of the transmission resource pool from the *tx-PoolMeasToAddModList*;

3> if the received *measObject* includes the *tx-PoolMeasToAddModList*:

4> for each transmission resource pool indicated in *tx-PoolMeasToAddModList*:

5> if an entry with the matchingidentity of the transmission resource poolexists in the *tx-PoolMeasToAddModList*:

6> replace the entry with the value received for this transmission resource pool;

5> else:

6> add a new entry for the received identity of the transmission resource pool to the *tx-PoolMeasToAddModList*;

3> if the received *measObject* includes the *ssb-PositionQCL-CellsToRemoveList*:

4> for each *physCellId* included in the *ssb-PositionQCL-CellsToRemoveList*:

5> remove the entry with the matching *physCellId* from the *ssb-PositionQCL-CellsToAddModList*;

3> if the received *measObject* includes the *ssb-PositionQCL-CellsToAddModList*:

4> for each *physCellId* included in the *ssb-PositionQCL-CellsToAddModList*:

5> if an entry with the matching *physCellId* exists in the *ssb-PositionQCL-CellsToAddModList*:

6> replace the entry with the value received for this *physCellId*;

5> else:

6> add a new entry for the received *physCellId* to the *ssb-PositionQCL-CellsToAddModList*;

2> else:

3> add a new entry for the received *measObject* to the *measObjectList* within *VarMeasConfig*.

#### 5.5.2.6 Reporting configuration removal

The UE shall:

1> for each *reportConfigId* included in the received *reportConfigToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:

2> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;

2> remove all *measId* associated with the *reportConfigId* from the *measIdList* within the *VarMeasConfig*, if any;

2> if a *measId* is removed from the *measIdList*:

3> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;

3> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

NOTE: The UE does not consider the message as erroneous if the *reportConfigToRemoveList* includes any *reportConfigId* value that is not part of the current UE configuration.

#### 5.5.2.7 Reporting configuration addition/modification

The UE shall:

1> for each *reportConfigId* included in the received *reportConfigToAddModList*:

2> if an entry with the matching *reportConfigId* exists in the *reportConfigList* within the *VarMeasConfig*, for this entry:

3> reconfigure the entry with the value received for this *reportConfig*;

3> for each *measId* associated with this *reportConfigId* included in the *measIdList* within the *VarMeasConfig*, if any:

4> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;

4> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;

2> else:

3> add a new entry for the received *reportConfig* to the *reportConfigList* within the *VarMeasConfig*.

#### 5.5.2.8 Quantity configuration

The UE shall:

1> for each RAT for which the received *quantityConfig* includes parameter(s):

2> set the corresponding parameter(s) in *quantityConfig* within *VarMeasConfig* to the value of the received *quantityConfig* parameter(s);

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

2> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;

2> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

#### 5.5.2.9 Measurement gap configuration

The UE shall:

1> if *gapFR1* is set to *setup*:

2> if an FR1 measurement gap configuration configured by *gapFR1* is already setup, release the FR1 measurement gap configuration;

2> setup the FR1 measurement gap configuration indicated by the *gapFR1* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

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

subframe = *gapOffset* mod 10;

with *T* = MGRP/10 as defined in TS 38.133 [14];

2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);

1> else if *gapFR1* is set to *release*:

2> release the FR1 measurement gap configuration configured by *gapFR1*;

1> if *gapFR2* is set to *setup*:

2> if an FR2 measurement gap configuration configured by *gapFR2* is already setup, release the FR2 measurement gap configuration;

2> setup the FR2 measurement gap configuration indicated by the *gapFR2* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

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

subframe = *gapOffset* mod 10;

with *T* = MGRP/10 as defined in TS 38.133 [14];

2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);

1> else if *gapFR2* is set to *release*:

2> release the FR2 measurement gap configuration configured by *gapFR2*;

1> if *gapUE* is set to *setup*:

2> if a per UE measurement gap configuration configured by *gapUE* is already setup, release the per UE measurement gap configuration;

2> setup the per UE measurement gap configuration indicated by the *gapUE* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

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

subframe = *gapOffset* mod 10;

with *T* = MGRP/10 as defined in TS 38.133 [14];

2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);

1> else if *gapUE* is set to *release*:

2> release the per UE measurement gap configuration configured by *gapUE*.

1> for each *measGapId* included in the received *gapToReleaseList*:

2> release the measurement gap configuration associated with the *measGapId*;

1> for each *measPosPreConfigGapId* included in the received *posMeasGapPreConfigToReleaseList*:

2> release the measurement gap configuration associated with the *measPosPreConfigGapId*;

1> for each *GapConfig* received in *gapToAddModList*:

2> setup measurement gap configuration indicated by the *GapConfig* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

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

subframe = *gapOffset* mod 10;

with *T* = MGRP/10 as defined in TS 38.133 [14];

2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);

2> apply the measurement gap as per UE measurement gap, FR1 measurement gap, or FR2 measurement gap according to the *gapType* indicated by the *GapConfig*;

2> associate the measurement gap with the *measGapId* indicated by the *GapConfig*;

2> if *gapSharing* in the *GapConfig* is present:

3> setup the gap sharing configuration for the measurement gap in accordance with the received *gapSharing* as defined in TS 38.133 [14];

2> else:

3> release the gap sharing configuration (if configured) for the measurement gap;

1> for each *PosGapConfig* received in *PosMeasGapPreConfigToAddModList*:

2> if a measurement gap configuration associated with the *measPosPreConfigGapId* indicated by the *PosGapConfig* is already setup:

3> release the measurement gap configuration;

2> setup measurement gap configuration indicated by the *PosGapConfig* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

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

subframe = *gapOffset* mod 10;

with *T* = MGRP/10 as defined in TS 38.133 [14];

2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);

2> configure the measurement gap as indicated by *gapType*;

1> for each FR1, FR2, and per UE measurement gap that is setup:

2> if the measurement gap is configured by *GapConfig* and *preConfigInd-r17* in the corresponding *GapConfig* is present:

3> determine whether the measurement gap is activated or not according to TS 38.133 [14];

2> else if the measurement gap is configured by *PosGapConfig*:

3> consider the measurement gap to be deactivated;

2> else:

3> consider the measurement gap to be activated.

NOTE 1: For FR2 gap configuration with synchronous CA, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* is used in the gap calculation. Otherwise, the SFN and subframe of a serving cell on FR2 frequency is used in the gap calculation

NOTE 2: For FR1 gap or per UE gap configuration, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* in is used in the gap calculation. Otherwise, the SFN and subframe of the PCell is used in the gap calculation.

NOTE 3: For FR2 gap configuration with asynchronous CA, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* and *refFR2ServCellAsyncCA* is used in the gap calculation. Otherwise, the SFN and subframe of a serving cell on FR2 frequency indicated by the *refFR2ServCellAsyncCA* is used in the gap calculation

#### 5.5.2.10 Reference signal measurement timing configuration

The UE shall setup the first SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *periodicityAndOffset* parameter (providing *Periodicity* and *Offset* value for the following condition) in the *smtc1* configuration. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell meeting the following condition:

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

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

subframe = *Offset* mod 10;

else:

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

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

If *smtc2* is present, for cells indicated in the *pci-List* parameter in *smtc2* in the same *MeasObjectNR*, the UE shall setup an additional SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *periodicity* parameter in the *smtc2* configuration and use the *Offset* (derived from parameter *periodicityAndOffset*) and *duration* parameter from the *smtc1* configuration. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell meeting the above condition.

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

If *smtc3list* is present, for cells indicated in the *pci-List* parameter in each *SSB-MTC3* element of the list in the same *MeasObjectNR*, the IAB-MT shall setup an additional SS block measurement timing configuration in accordance with the received *periodicityAndOffset* parameter (using same condition as *smtc1* to identify the SFN and the subframe for SMTC occasion) in each SSB-MTC3 configuration and use the duration and *ssb-ToMeasure* parameters from each SSB-MTC3 configuration.

If *smtc4list* is present, for cells indicated in the *pci-List* parameter in each *SSB-MTC4* element of the list in the same *MeasObjectNR*, the UE shall setup an additional SS /PBCH block measurement timing configuration (SMTC) in accordance with the received received *periodicity* parameter in the *smtc4* configuration and use the *Offset* (derived from parameter *periodicityAndOffset*) and *duration* parameter from the *smtc1* configuration. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell meeting the above condition.

On the indicated *ssbFrequency*, the UE shall not consider SS/PBCH block transmission in subframes outside the SMTC occasion for RRM measurements based on SS/PBCH blocks and for RRM measurements based on CSI-RS except for SFTD measurement (see TS 38.133 [14], clause 9.3.8).

#### 5.5.2.10a RSSI measurement timing configuration

The UE shall setup the RSSI measurement timing configuration (RMTC) in accordance with the received *rmtc-Periodicity* and, if configured, with *rmtc-SubframeOffset* i.e. the first symbol of each RMTC occasion occurs at first symbol of an SFN and subframe of the NR SpCell meeting the following condition:

SFN mod *T* = FLOOR(*rmtc-SubframeOffset*/10);

subframe = *rmtc-SubframeOffset* mod 10;

with *T* = *rmtc-Periodicity*/10;

On the frequency configured by *rmtc-Frequency*, the UE shall not consider RSSI measurements outside the configured RMTC occasion which lasts for *measDurationSymbols* for RSSI and channel occupancy measurements.

The UE derives the RSSI measurement duration from a combination of *measDurationSymbols* and *ref-SCS-CP*. At least for RSSI measurement confined within the active DL BWP, the UE performs RSSI measurement using the numerology of the active DL BWP during the derived measurement duration. Otherwise, the numerology used by the UE for measurements is up to UE implementation. If configured, the UE performs RSSI measurements on a bandwidth in accordance with the received *rmtc-Bandwidth*.

#### 5.5.2.11 Measurement gap sharing configuration

The UE shall:

1> if *gapSharingFR1* is set to *setup*:

2> if an FR1 measurement gap sharing configuration configured by *gapSharingFR1* is already setup:

3> release the FR1 measurement gap sharing configuration configured by *gapSharingFR1*;

2> setup the FR1 measurement gap sharing configuration indicated by the *measGapSharingConfig* in accordance with the received *gapSharingFR1* as defined in TS 38.133 [14];

1> else if *gapSharingFR1* is set to *release*:

2> release the FR1 measurement gap sharing configuration configured by *gapSharingFR1*;

1> if *gapSharingFR2* is set to *setup*:

2> if an FR2 measurement gap sharing configuration configured by *gapSharingFR2* is already setup:

3> release the FR2 measurement gap sharing configuration configured by *gapSharingFR2*;

2> setup the FR2 measurement gap sharing configuration indicated by the *measGapSharingConfig* in accordance with the received *gapSharingFR2* as defined in TS 38.133 [14];

1> else if *gapSharingFR2* is set to *release*:

2> release the FR2 measurement gap sharing configuration configured by *gapSharingFR2*.

1> if *gapSharingUE* is set to *setup*:

2> if a per UE measurement gap sharing configuration configured by *gapSharingUE* is already setup:

3> release the per UE measurement gap sharing configuration configured by *gapSharingUE*;

2> setup the per UE measurement gap sharing configuration indicated by the *measGapSharingConfig* in accordance with the received *gapSharingUE* as defined in TS 38.133 [14];

1> else if *gapSharingUE* is set to *release*:

2> release the per UE measurement gap sharing configuration configured by *gapSharingUE*.

### 5.5.3 Performing measurements

#### 5.5.3.1 General

An RRC\_CONNECTED UE shall derive cell measurement results by measuring one or multiple beams associated per cell as configured by the network, as described in 5.5.3.3. For all cell measurement results, except for RSSI, and CLI measurement results in RRC\_CONNECTED, the UE applies the layer 3 filtering as specified in 5.5.3.2, before using the measured results for evaluation of reporting criteria, measurement reporting or the criteria to trigger conditional reconfiguration execution. For cell measurements, the network can configure RSRP, RSRQ, SINR, RSCP or EcN0 as trigger quantity. For CLI measurements, the network can configure SRS-RSRP or CLI-RSSI as trigger quantity. For cell and beam measurements, reporting quantities can be any combination of quantities (i.e. only RSRP; only RSRQ; only SINR; RSRP and RSRQ; RSRP and SINR; RSRQ and SINR; RSRP, RSRQ and SINR; only RSCP; only EcN0; RSCP and EcN0), irrespective of the trigger quantity, and for CLI measurements, reporting quantities can be either SRS-RSRP or CLI-RSSI. For conditional reconfiguration execution, the network can configure up to 2 quantities, both using same RS type. The UE does not apply the layer 3 filtering as specified in 5.5.3.2 to derive the CBR measurements. The UE does not apply the layer 3 filtering as specified in 5.5.3.2 to derive the Rx-Tx time difference measurements.

The network may also configure the UE to report measurement information per beam (which can either be measurement results per beam with respective beam identifier(s) or only beam identifier(s)), derived as described in 5.5.3.3a. If beam measurement information is configured to be included in measurement reports, the UE applies the layer 3 beam filtering as specified in 5.5.3.2. On the other hand, the exact L1 filtering of beam measurements used to derive cell measurement results is implementation dependent.

The UE shall:

1> whenever the UE has a *measConfig*, perform RSRP and RSRQ measurements for each serving cell for which *servingCellMO* is configured as follows:

2> if the *reportConfig* associated with at least one *measId* included in the *measIdList* within *VarMeasConfig* contains an *rsType* set to *ssb* and *ssb-ConfigMobility* is configured in the *measObject* indicated by the *servingCellMO*:

3> if the *reportConfig* associated with at least one *measId* included in the *measIdList* within *VarMeasConfig* contains a *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport* and contains an *rsType* set to *ssb*:

4> derive layer 3 filtered RSRP and RSRQ per beam for the serving cell based on SS/PBCH block, as described in 5.5.3.3a;

3> derive serving cell measurement results based on SS/PBCH block, as described in 5.5.3.3;

2> if the *reportConfig* associated with at least one *measId* included in the *measIdList* within *VarMeasConfig* contains an *rsType* set to *csi-rs* and *CSI-RS-ResourceConfigMobility* is configured in the *measObject* indicated by the *servingCellMO*:

3> if the *reportConfig* associated with at least one *measId* included in the *measIdList* within *VarMeasConfig* contains a *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport* and contains an *rsType* set to *csi-rs*:

4> derive layer 3 filtered RSRP and RSRQ per beam for the serving cell based on CSI-RS, as described in 5.5.3.3a;

3> derive serving cell measurement results based on CSI-RS, as described in 5.5.3.3;

1> for each serving cell for which *servingCellMO* is configured, if the *reportConfig* associated with at least one *measId* included in the *measIdList* within *VarMeasConfig* contains SINR as trigger quantity and/or reporting quantity:

2> if the *reportConfig* contains *rsType* set to *ssb* and *ssb-ConfigMobility* is configured in the *servingCellMO*:

3> if the *reportConfig*contains a *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:

4> derive layer 3 filtered SINR per beam for the serving cell based on SS/PBCH block, as described in 5.5.3.3a;

3> derive serving cell SINR based on SS/PBCH block, as described in 5.5.3.3;

2> if the *reportConfig* contains *rsType* set to *csi-rs* and *CSI-RS-ResourceConfigMobility* is configured in the *servingCellMO*:

3> if the *reportConfig*contains a *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:

4> derive layer 3 filtered SINR per beam for the serving cell based on CSI-RS, as described in 5.5.3.3a;

3> derive serving cell SINR based on CSI-RS, as described in 5.5.3.3;

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

2> if the *reportType* for the associated *reportConfig* is set to *reportCGI* and timer T321 is running:

3> if *useAutonomousGaps* is configured for the associated *reportConfig*:

4> perform the corresponding measurements on the frequency and RAT indicated in the associated *measObject* using autonomous gaps as necessary;

3> else:

4> perform the corresponding measurements on the frequency and RAT indicated in the associated *measObject* using available idle periods;

3> if the cell indicated by *reportCGI* field for the associated *measObject* is an NR cell and that indicated cell is broadcasting *SIB1* (see TS 38.213 [13], clause 13):

4> try to acquire *SIB1* in the concerned cell;

3> if the cell indicated by *reportCGI* field is an E-UTRA cell:

4> try to acquire *SystemInformationBlockType1* in the concerned cell;

2> if the *ul-DelayValueConfig* is configured for the associated *reportConfig*:

3> ignore the *measObject;*

3> for each of the configured DRBs*,* configure the PDCP layer to perform corresponding average UL PDCP packet delay measurement per DRB;

2> if the *ul-ExcessDelayConfig* is configured for the associated *reportConfig*:

3> ignore the *measObject;*

3> for each of the configured DRBs*,* configure the PDCP layer to perform corresponding UL PDCP Excess Packet Delay delay measurement according to the configured threshold per DRB;

2> if the *reportType* for the associated *reportConfig* is *periodical*, *eventTriggered*; or

2> if the *reportType* for the associated *reportConfig* is *condTriggerConfig* and the *measId* is indicated in the *condExecutionCond* or in the *condExecutionCondSCG* associated to a *condReconfigId* in *VarConditionalReconfig*:

3> if a measurement gap configuration is setup, or

3> if the UE does not require measurement gaps to perform the concerned measurements:

4> if *s-MeasureConfig* is not configured, or

4> if *s-MeasureConfig* is set to *ssb-RSRP* and the NR SpCell RSRP based on SS/PBCH block, after layer 3 filtering, is lower than *ssb-RSRP,* or

4> if *s-MeasureConfig* is set to *csi-RSRP* and the NR SpCell RSRP based on CSI-RS, after layer 3 filtering, is lower than *csi-RSRP*:

5> if the *measObject* is associated to NR and the *rsType* is set to *csi-rs*:

6> if reportQuantityRS-Indexes and maxNrofRS-IndexesToReport for the associated reportConfig are configured:

7> derive layer 3 filtered beam measurements only based on CSI-RS for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in 5.5.3.3a;

6> derive cell measurement results based on CSI-RS for the trigger quantity and each measurement quantity indicated in *reportQuantityCell* using parameters from the associated *measObject*, as described in 5.5.3.3;

5> if the *measObject* is associated to NR and the *rsType* is set to *ssb*:

6> if reportQuantityRS-Indexes and maxNrofRS-IndexesToReport for the associated reportConfig are configured:

7> derive layer 3 beam measurements only based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in 5.5.3.3a;

6> derive cell measurement results based on SS/PBCH block for the trigger quantity and each measurement quantity indicated in *reportQuantityCell* using parameters from the associated *measObject*, as described in 5.5.3.3;

5> if the *measObject* is associated to E-UTRA:

6> perform the corresponding measurements associated to neighbouring cells on the frequencies indicated in the concerned *measObject*, as described in 5.5.3.2;

5> if the measObject is associated to UTRA-FDD:

6> perform the corresponding measurements associated to neighbouring cells on the frequencies indicated in the concerned *measObject*, as described in 5.5.3.2;

5> if the measObject is associated to L2 U2N Relay UE:

6> perform the corresponding measurements associated to candidate Relay UEs on the frequencies indicated in the concerned *measObject*, as described in 5.5.3.4;

4> if the *measRSSI-ReportConfig* is configured in the associated *reportConfig*:

5> perform the RSSI and channel occupancy measurements on the frequency indicated in the associated *measObject*;

2> if the *reportType* for the associated *reportConfig* is set to *reportSFTD* and the *numberOfReportsSent* as defined within the *VarMeasReportList* for this *measId* is less than one:

3> if the *reportSFTD-Meas* is set to *true:*

4> if the *measObject* is associated to E-UTRA:

5> perform SFTD measurements between the PCell and the E-UTRA PSCell;

5> if the *reportRSRP* is set to *true*;

6> perform RSRP measurements for the E-UTRA PSCell;

4> else if the *measObject* is associated to NR:

5> perform SFTD measurements between the PCell and the NR PSCell;

5> if the *reportRSRP* is set to *true*;

6> perform RSRP measurements for the NR PSCell based on SSB;

3> else if the *reportSFTD-NeighMeas* is included*:*

4> if the *measObject* is associated to NR:

5> if the *drx-SFTD-NeighMeas* is included:

6> perform SFTD measurements between the PCell and the NR neighbouring cell(s) detected based on parameters in the associated *measObject* using available idle periods;

5> else:

6> perform SFTD measurements between the PCell and the NR neighbouring cell(s) detected based on parameters in the associated *measObject*;

5> if the *reportRSRP* is set to *true*:

6> perform RSRP measurements based on SSB for the NR neighbouring cell(s) detected based on parameters in the associated *measObject*;

2> if the *reportType* for the associated *reportConfig* is *cli-Periodical* or *cli-EventTriggered*:

3> perform the corresponding measurements associated to CLI measurement resources indicated in the concerned *measObjectCLI*;

2> perform the evaluation of reporting criteria as specified in 5.5.4, except if *reportConfig* is *condTriggerConfig*.

NOTE 1: The evaluation of conditional reconfiguration execution criteria is specified in 5.3.5.13.

The UE capable of Rx-Tx time difference measurement when configured with *measObjectRxTxDiff* shall:

1> perform the corresponding Rx-Tx time difference measurements associated with downlink reference signals indicated in the concerned *measObjectRxTxDiff*.

The UE capable of CBR measurement when configured to transmit NR sidelink communication/discovery shall:

1> If the frequency used for NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-ConfigCommonNR* within *SIB12*:

2> if the UE is in RRC\_IDLE or in RRC\_INACTIVE:

3> if configured with NR sidelink communication and the cell chosen for NR sidelink communication provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* forthe concerned frequency; or

3> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* but does not include *sl-DiscTxPoolSelected* forthe concerned frequency:

4> perform CBR measurement on pools in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

3> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides *SIB12* which includes *sl-DiscTxPoolSelected* forthe concerned frequency:

4> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

2> if the UE is in RRC\_CONNECTED:

3> if *tx-PoolMeasToAddModList* is included in *VarMeasConfig*:

4> perform CBR measurements on each transmission resource pool indicated in the *tx-PoolMeasToAddModList*;

3> if *sl-DiscTxPoolSelected*, *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* is included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*:

4> perform CBR measurement on pool(s) in *sl-DiscTxPoolSelected*, *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* and *sl-TxPoolExceptional* if included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*;

3> else:

4> if configured with NR sidelink communication and the cell chosen for NR sidelink communication provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* forthe concerned frequency; or

4> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* but does not provide *sl-DiscTxPoolSelected* forthe concerned frequency:

5> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

4> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides *SIB12* which includes *sl-DiscTxPoolSelected* forthe concerned frequency:

5> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

1> else:

2> if configured with NR sidelink communication and *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* is included in *SidelinkPreconfigNR* for the concerned frequency; or

2> if configured with NR sidelink discovery and *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* is included in *SidelinkPreconfigNR* but *sl-DiscTxPoolSelected* is not included in *SidelinkPreconfigNR* for the concerned frequency:

3> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* in *SidelinkPreconfigNR* for the concerned frequency.

2> if configured with NR sidelink discovery and *sl-DiscTxPoolSelected* is included in *SidelinkPreconfigNR* for the concerned frequency:

3> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* if included in *SidelinkPreconfigNR*;

NOTE 2: In case the configurations for NR sidelink communication and CBR measurement are acquired via the E-UTRA, configurations for NR sidelink communication in *SIB12*, *sl-ConfigDedicatedNR* within *RRCReconfiguration* used in this clause are provided by the configurations in *SystemInformationBlockType28*, *sl-ConfigDedicatedForNR* within *RRCConnectionReconfiguration* as specified in TS 36.331[10], respectively.

NOTE 3: If a UE that is configured by upper layers to transmit V2X sidelink communication is configured by NR with transmission resource pool(s) and the measurement objects concerning V2X sidelink communication (i.e. by *sl-ConfigDedicatedEUTRA-Info*), it shall perform CBR measurement as specified in clause 5.5.3 of TS 36.331 [10], based on the transmission resource pool(s) and the measurement object(s) concerning V2X sidelink communication configured by NR.

NOTE 4: For V2X sidelink communication, each of the CBR measurement results is associated with a resource pool, as indicated by the *poolReportId* (see TS 36.331 [10]), that refers to a pool as included in *sl-ConfigDedicatedEUTRA-Info* or *SIB13*.

Editors Note: FFS to specify that the UE ignores measId(s) that were not indicated in the condExecutionCond/triggerCondition.

#### 5.5.3.2 Layer 3 filtering

The UE shall:

1> for each cell measurement quantity, each beam measurement quantity, each sidelink measurement quantity as needed in clause 5.8.10, for each CLI measurement quantity that the UE performs measurements according to 5.5.3.1, and for each candidate L2 U2N Relay UE measurement quantity according to 5.5.3.4:

2> filter the measured result, before using for evaluation of reporting criteria or for measurement reporting, by the following formula:

***F*n = (1 – *a*)\**F*n-1 + *a*\**M*n**

where

***Mn*** is the latest received measurement result from the physical layer;

***Fn*** is the updated filtered measurement result, that is used for evaluation of reporting criteria or for measurement reporting;

***Fn-1*** is the old filtered measurement result, where ***F0*** is set to ***M1*** when the first measurement result from the physical layer is received; and for *MeasObjectNR*, ***a*** = 1/2(***ki***/4), where ***ki*** is the *filterCoefficient* for the corresponding measurement quantity of the i:th *QuantityConfigNR* in *quantityConfigNR-List*, and *i* is indicated by *quantityConfigIndex* in *MeasObjectNR*; for other measurements, ***a*** = 1/2(***k***/4), where ***k*** is the *filterCoefficient* for the corresponding measurement quantity received by the *quantityConfig*; for UTRA-FDD, a = 1/2(k/4), where k is the filterCoefficient for the corresponding measurement quantity received by *quantityConfigUTRA-FDD* in the *QuantityConfig*;

2> adapt the filter such that the time characteristics of the filter are preserved at different input rates, observing that the *filterCoefficient k* assumes a sample rate equal to X ms; The value of X is equivalent to one intra-frequency L1 measurement period as defined in TS 38.133 [14] assuming non-DRX operation, and depends on frequency range.

NOTE 1: If ***k*** is set to 0, no layer 3 filtering is applicable.

NOTE 2: The filtering is performed in the same domain as used for evaluation of reporting criteria or for measurement reporting, i.e., logarithmic filtering for logarithmic measurements.

NOTE 3: The filter input rate is implementation dependent, to fulfil the performance requirements set in TS 38.133 [14]. For further details about the physical layer measurements, see TS 38.133 [14].

NOTE 4: For CLI-RSSI measurement, it is up to UE implementation whether to reset filtering upon BWP switch.

#### 5.5.3.3 Derivation of cell measurement results

The network may configure the UE in RRC\_CONNECTED to derive RSRP, RSRQ and SINR measurement results per cell associated to NR measurement objects based on parameters configured in the *measObject* (e.g. maximum number of beams to be averaged and beam consolidation thresholds) and in the *reportConfig* (*rsType* to be measured, SS/PBCH block or CSI-RS).

The network may configure the UE in RRC\_IDLE or in RRC\_INACTIVE to derive RSRP and RSRQ measurement results per cell associated to NR carriers based on parameters configured in *measIdleCarrierListNR* within *VarMeasIdleConfig* for measurements performed according to 5.7.8.2a.

The UE shall:

1> for each cell measurement quantity to be derived based on SS/PBCH block:

2> if *nrofSS-BlocksToAverage* is not configured in the associated *measObject* in RRC\_CONNECTED or in the associated entry in *measIdleCarrierListNR* within *VarMeasIdleConfig* in RRC\_IDLE/RRC\_INACTIVE; or

2> if *absThreshSS-BlocksConsolidation* is not configured in the associated *measObject* in RRC\_CONNECTED or in the associated entry in *measIdleCarrierListNR* within *VarMeasIdleConfig* in RRC\_IDLE/RRC\_INACTIVE; or

2> if the highest beam measurement quantity value is below or equal to *absThreshSS-BlocksConsolidation*:

3> derive each cell measurement quantity based on SS/PBCH block as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [9];

2> else:

3> derive each cell measurement quantity based on SS/PBCH block as the linear power scale average of the highest beam measurement quantity values above *absThreshSS-BlocksConsolidation* where the total number of averaged beams shall not exceed *nrofSS-BlocksToAverage*, and where each beam measurement quantity is described in TS 38.215 [9];

2> if in RRC\_CONNECTED, apply layer 3 cell filtering as described in 5.5.3.2;

1> for each cell measurement quantity to be derived based on CSI-RS:

2> consider a CSI-RS resource to be applicable for deriving cell measurements when the concerned CSI-RS resource is included in the *csi-rs-CellMobility* including the *physCellId* of the cell in the*CSI-RS-ResourceConfigMobility* in the associated *measObject*;

2> if *nrofCSI-RS-ResourcesToAverage* in the associated *measObject* is not configured; or

2> if *absThreshCSI-RS-Consolidation* in the associated *measObject* is not configured; or

2> if the highest beam measurement quantity value is below or equal to *absThreshCSI-RS-Consolidation*:

3> derive each cell measurement quantity based on applicable CSI-RS resources for the cell as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [9];

2> else:

3> derive each cell measurement quantity based on CSI-RS as the linear power scale average of the highest beam measurement quantity values above *absThreshCSI-RS-Consolidation* where the total number of averaged beams shall not exceed *nrofCSI-RS-ResourcesToAverage*;

2> apply layer 3 cell filtering as described in 5.5.3.2.

#### 5.5.3.3a Derivation of layer 3 beam filtered measurement

The UE shall:

1> for each layer 3 beam filtered measurement quantity to be derived based on SS/PBCH block;

2> derive each configured beam measurement quantity based on SS/PBCH block as described in TS 38.215[9], and apply layer 3 beam filtering as described in 5.5.3.2;

1> for each layer 3 beam filtered measurement quantity to be derived based on CSI-RS;

2> derive each configured beam measurement quantity based on CSI-RS as described in TS 38.215 [9], and apply layer 3 beam filtering as described in 5.5.3.2.

#### 5.5.3.4 Derivation of L2 U2N Relay UE measurement results

A UE may be configured by network to derive NR sidelink measurement results of serving L2 U2N Relay UE or candidate L2 U2N Relay UEs associated to the measurement objects configured in the *measObjectRelay*.

The UE shall:

1> for each L2 U2N Relay UE measurement quantity to be derived:

2> derive the corresponding measurement quantity based on DMRS as described in TS 38.215 [9] of the L2 U2N Relay UE associated to the NR sidelink frequency indicated in the concerned *measObjectRelay*;

2> apply layer 3 filtering as described in 5.5.3.2;

### 5.5.4 Measurement report triggering

#### 5.5.4.1 General

If AS security has been activated successfully, the UE shall:

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

2> if the corresponding *reportConfig* includes a *reportType* set to *eventTriggered* or *periodical*:

3> if the corresponding *measObject* concerns NR:

4> if the corresponding *reportConfig* includes *measRSSI-ReportConfig*:

5> consider the resource indicated by the *rmtc-Config* on the associated frequency to be applicable;

4> if the *eventA1* or *eventA2* is configured in the corresponding *reportConfig*:

5> consider only the serving cell to be applicable;

4> if the *eventA3* or *eventA5* is configured in the corresponding *reportConfig*:

5> if a serving cell is associated with a *measObjectNR* and neighbours are associated with another *measObjectNR*, consider any serving cell associated with the other *measObjectNR* to be a neighbouring cell as well;

4> if the *eventX2* is configured in the corresponding *reportConfig*:

5> consider only the serving L2 U2N Relay UE to be applicable;

4> if corresponding *reportConfig* includes *reportType* set to *periodical*; or

4> for measurement events other than *eventA1,* *eventA2, eventD1* or *eventX2*:

5> if *useAllowedCellList* is set to *true*:

6> consider any neighbouring cell detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cell is included in the *allowedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;

5> else:

6> consider any neighbouring cell detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cell is not included in the *excludedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;

3> else if the corresponding *measObject* concerns E-UTRA:

4> if *eventB1* or *eventB2* is configured in the corresponding *reportConfig*:

5> consider a serving cell, if any, on the associated E-UTRA frequency as neighbour cell;

4> consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is not included in the *excludedCellsToAddModListEUTRAN* defined within the *VarMeasConfig* for this *measId*;

3> else if the corresponding *measObject* concerns UTRA-FDD:

4> if *eventB1-UTRA-FDD* or *eventB2-UTRA-FDD* is configured in the corresponding *reportConfig*; or

4> if corresponding *reportConfig* includes *reportType* set to *periodical*:

5> consider a neighbouring cell on the associated frequency to be applicable when the concerned cell is included in the *cellsToAddModList* defined within the *VarMeasConfig* for this *measId*;

3> else if the corresponding *measObject* concerns L2 U2N Relay UE:

4> if *eventY1-Relay* or *eventY2-Relay* is configured in the corresponding *reportConfig*; or

4> if corresponding *reportConfig* includes *reportType* set to *periodical*:

5> consider any L2 U2N Relay UE fulfilling upper layer criteria detected on the associated frequency to be applicable for this *measId*;

2> else if the corresponding *reportConfig* includes a *reportType* set to *reportCGI*:

3> consider the cell detected on the associated *measObject* which has a physical cell identity matching the value of the *cellForWhichToReportCGI* included in the corresponding *reportConfig* within the *VarMeasConfig* to be applicable;

2> else if the corresponding *reportConfig* includes a *reportType* set to *reportSFTD*:

3> if the corresponding *measObject* concerns NR:

4> if the *reportSFTD-Meas* is set to *true*:

5> consider the NR PSCell to be applicable;

4> else if the *reportSFTD-NeighMeas* is included:

5> if *cellsForWhichToReportSFTD* is configured in the corresponding *reportConfig*:

6> consider any NR neighbouring cell detected on the associated *measObjectNR* which has a physical cell identity that is included in the *cellsForWhichToReportSFTD* to be applicable;

5> else:

6> consider up to 3 strongest NR neighbouring cells detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cells are not included in the *excludedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;

3> else if the corresponding *measObject* concerns E-UTRA:

4> if the *reportSFTD-Meas* is set to *true*:

5> consider the E-UTRA PSCell to be applicable;

2> else if the corresponding *reportConfig* includes a *reportType* set to *cli-Periodical or cli-EventTriggered*:

3> consider all CLI measurement resources included in the corresponding *measObject* to be applicable;

2> else if the corresponding *reportConfig* includes a *reportType* set to *rxTxPeriodical*:

3> consider all Rx-Tx time difference measurement resources included in the corresponding *measObject* to be applicable;

2> if the corresponding *reportConfig* concerns the reporting for NR sidelink communication/discovery (i.e. *reportConfigNR-SL*):

3> consider the transmission resource pools indicated by the *tx-PoolMeasToAddModList* defined within the *VarMeasConfig* for this *measId* to be applicable;

2> if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable cells for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include a measurement reporting entry for this *measId* (a first cell triggers the event):

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> if *useT312* is set to *true* in *reportConfig* for this event:

4> if T310 for the corresponding SpCell is running; and

4> if T312 is not running for corresponding SpCell:

5> start timer T312 for the corresponding SpCell with the value of T312 configured in the corresponding *measObjectNR*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable cells not included in the *cellsTriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent cell triggers the event):

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> if *useT312* is set to *true* in *reportConfig* for this event:

4> if T310 for the corresponding SpCell is running; and

4> if T312 is not running for corresponding SpCell:

5> start timer T312 for the corresponding SpCell with the value of T312 configured in the corresponding *measObjectNR*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *eventTriggered* and if the leaving condition applicable for this event is fulfilled for one or more of the cells included in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId* for all measurements after layer 3 filtering taken during *timeToTrigger* defined within the *VarMeasConfig* for this event:

3> remove the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> if *reportOnLeave* is set to *true* for the corresponding reporting configuration:

4> initiate the measurement reporting procedure, as specified in 5.5.5;

3> if the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:

4> remove the measurement reporting entry within the *VarMeasReportList* for this *measId*;

4> stop the periodical reporting timer for this *measId*, if running;

2> if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable L2 U2N Relay UEs for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include a measurement reporting entry for this *measId* (a first L2 U2N Relay UE triggers the event):

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned L2 U2N Relay UE(s) in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable L2 U2N Relay UEs not included in the *relaysTriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent L2 U2N Relay UE triggers the event):

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned L2 U2N Relay UE(s) in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *eventTriggered* and if the leaving condition applicable for this event is fulfilled for one or more of the L2 U2N Relay UEs included in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId* for all measurements after layer 3 filtering taken during *timeToTrigger* defined within the *VarMeasConfig* for this event:

3> remove the concerned L2 U2N Relay UE(s) in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> if *reportOnLeave* is set to *true* for the corresponding reporting configuration:

4> initiate the measurement reporting procedure, as specified in 5.5.5;

3> if the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:

4> remove the measurement reporting entry within the *VarMeasReportList* for this *measId*;

4> stop the periodical reporting timer for this *measId*, if running;

2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable transmission resource pools for all measurements taken during *timeToTrigger* defined for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include an measurement reporting entry for this *measId* (a first transmission resource pool triggers the event):

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable transmission resource pools not included in the *poolsTriggeredList* for all measurements taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent transmission resource pool triggers the event):

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *eventTriggered* and if the leaving condition applicable for this event is fulfilled for one or more applicable transmission resource pools included in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId* for all measurements taken during *timeToTrigger* defined within the *VarMeasConfig* for this event:

3> remove the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> if the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:

4> remove the measurement reporting entry within the *VarMeasReportList* for this *measId*;

4> stop the periodical reporting timer for this *measId*, if running

2> else if the *reportType* is set to *eventTriggered* and if the *eventId* is set to *eventD1* and if the entering condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled during *timeToTrigger* defined within the *VarMeasConfig* for this event:

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *eventTriggered* and if the *eventId* is set to *eventD1* and if the leaving condition applicable for this event is fulfilled for the associated *VarMeasReport* within the *VarMeasReportList* for this *measId* during *timeToTrigger* defined within the *VarMeasConfig* for this event:

3> if *reportOnLeave* is set to *true* for the corresponding reporting configuration:

4> initiate the measurement reporting procedure, as specified in 5.5.5;

3> remove the measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> stop the periodical reporting timer for this *measId*, if running;

NOTE 1: Void.

2> if *reportType* is set to *periodical* and if a (first) measurement result is available:

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> if the corresponding *reportConfig* includes *measRSSI-ReportConfig*:

4> initiate the measurement reporting procedure as specified in 5.5.5 immediately when RSSI sample values are reported by the physical layer after the first L1 measurement duration;

3> else if the corresponding *reportConfig* includes the *ul-DelayValueConfig*:

4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after a first measurement result is provided from lower layers of the associated DRB identity;

3> else if the corresponding *reportConfig* includes the *ul-ExcessDelayConfig*:

4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after a first measurement result is provided from lower layers of the associated DRB identity(ies) according to the configured threshold per DRB identity(ies);

3> else if the *reportAmount* exceeds 1:

4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the NR SpCell or for the serving L2 U2N Relay UE (if the UE is a L2 U2N Remote UE);

3> else (i.e. the *reportAmount* is equal to 1):

4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the NR SpCell and for the strongest cell among the applicable cells, or for the NR SpCell and for the strongest L2 U2N Relay UEs among the applicable L2 U2N Relay UEs; or initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the serving L2 U2N Relay UE and for the strongest cell among the applicable cells (if the UE is a L2 U2N Remote UE);

2> if, in case the corresponding *reportConfig* concerns the reporting for NR sidelink communication/discovery, *reportType* is set to *periodical* and if a (first) measurement result is available:

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the NR SpCell and CBR measurement results become available;

2> if the *reportType* is set to *cli-EventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable CLI measurement resources for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include a measurement reporting entry for this *measId* (a first CLI measurement resource triggers the event):

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned CLI measurement resource(s) in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *cli-EventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more CLI measurement resources not included in the *cli-TriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent CLI measurement resource triggers the event):

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> include the concerned CLI measurement resource(s) in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> else if the *reportType* is set to *cli-EventTriggered* and if the leaving condition applicable for this event is fulfilled for one or more of the CLI measurement resources included in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId* for all measurements after layer 3 filtering taken during *timeToTrigger* defined within the *VarMeasConfig* for this event:

3> remove the concerned CLI measurement resource(s) in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId*;

3> if *reportOnLeave* is set to *true* for the corresponding reporting configuration:

4> initiate the measurement reporting procedure, as specified in 5.5.5;

3> if the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:

4> remove the measurement reporting entry within the *VarMeasReportList* for this *measId*;

4> stop the periodical reporting timer for this measId, if running;

2> if *reportType* is set to *cli-Periodical* and if a (first) measurement result is available:

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for at least one CLI measurement resource;

2> if *reportType* is set to *rxTxPeriodical* and if a (first) measurement result is available:

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> upon expiry of the periodical reporting timer for this *measId*:

3> initiate the measurement reporting procedure, as specified in 5.5.5.

2> if the corresponding *reportConfig* includes a *reportType* is set to *reportSFTD*:

3> if the corresponding *measObject* concerns NR:

4> if the *drx-SFTD-NeighMeas* is included:

5> if the quantity to be reported becomes available for each requested pair of PCell and NR cell:

6> stop timer T322;

6> initiate the measurement reporting procedure, as specified in 5.5.5;

4> else

5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for each requested pair of PCell and NR cell or the maximal measurement reporting delay as specified in TS 38.133 [14];

3> else if the corresponding *measObject* concerns E-UTRA:

4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the pair of PCell and E-UTRA PSCell or the maximal measurement reporting delay as specified in TS 38.133 [14];

2> if *reportType* is set to *reportCGI*:

3> if the UE acquired the *SIB1* or *SystemInformationBlockType1* for the requested cell; or

3> if the UE detects that the requested NR cell is not transmitting *SIB1* (see TS 38.213 [13], clause 13):

4> stop timer T321;

4> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

4> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

4> initiate the measurement reporting procedure, as specified in 5.5.5;

2> upon the expiry of T321 for this *measId*:

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> initiate the measurement reporting procedure, as specified in 5.5.5.

2> upon the expiry of T322 for this *measId*:

3> initiate the measurement reporting procedure, as specified in 5.5.5.

#### 5.5.4.2 Event A1 (Serving becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A1-2, as specified below, is fulfilled;

1> for this measurement, consider the NR serving cell corresponding to the associated *measObjectNR* associated with this event.

Inequality A1-1 (Entering condition)

*Ms – Hys > Thresh*

Inequality A1-2 (Leaving condition)

*Ms + Hys < Thresh*

The variables in the formula are defined as follows:

***Ms*** is the measurement result of the serving cell, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *a1-Threshold* as defined within *reportConfigNR* for this event).

***Ms*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

***Hys*** is expressed in dB.

***Thresh*** is expressed in the same unit as ***Ms***.

#### 5.5.4.3 Event A2 (Serving becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A2-2, as specified below, is fulfilled;

1> for this measurement, consider the serving cell indicated by the *measObjectNR* associated to this event.

Inequality A2-1 (Entering condition)

*Ms + Hys < Thresh*

Inequality A2-2 (Leaving condition)

*Ms – Hys > Thresh*

The variables in the formula are defined as follows:

***Ms*** is the measurement result of the serving cell, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *a2-Threshold* as defined within *reportConfigNR* for this event).

***Ms*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

***Hys*** is expressed in dB.

***Thresh*** is expressed in the same unit as ***Ms***.

#### 5.5.4.4 Event A3 (Neighbour becomes offset better than SpCell)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A3-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A3-2, as specified below, is fulfilled;

1> use the SpCell for *Mp*, *Ofp and Ocp*.

NOTE 1: The cell(s) that triggers the event has reference signals indicated in the *measObjectNR* associated to this event which may be different from the NR SpCell *measObjectNR*.

Inequality A3-1 (Entering condition)

*Mn + Ofn + Ocn – Hys > Mp + Ofp + Ocp + Off*

Inequality A3-2 (Leaving condition)

*Mn + Ofn + Ocn + Hys < Mp + Ofp + Ocp + Off*

The variables in the formula are defined as follows:

***Mn*** is the measurement result of the neighbouring cell, not taking into account any offsets.

***Ofn*** is the measurement object specific offset of the reference signal of the neighbour cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the neighbour cell).

***Ocn*** is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.

***Mp*** is the measurement result of the SpCell, not taking into account any offsets.

***Ofp*** is the measurement object specific offset of the SpCell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the SpCell).

***Ocp*** is the cell specific offset of the SpCell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the SpCell), and is set to zero if not configured for the SpCell.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Off*** is the offset parameter for this event (i.e. *a3-Offset* as defined within *reportConfigNR* for this event).

***Mn, Mp*** are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

***Ofn***, ***Ocn***, ***Ofp***, ***Ocp***, ***Hys***, ***Off*** are expressed in dB.

NOTE 2: The definition of Event A3 also applies to CondEvent A3.

#### 5.5.4.5 Event A4 (Neighbour becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A4-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A4-2, as specified below, is fulfilled.

Inequality A4-1 (Entering condition)

*Mn + Ofn + Ocn – Hys > Thresh*

Inequality A4-2 (Leaving condition)

*Mn + Ofn + Ocn + Hys < Thresh*

The variables in the formula are defined as follows:

***Mn*** is the measurement result of the neighbouring cell, not taking into account any offsets.

***Ofn*** is the measurement object specific offset of the neighbour cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the neighbour cell).

***Ocn*** is the measurement object specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the neighbour cell), and set to zero if not configured for the neighbour cell.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *a4-Threshold* as defined within *reportConfigNR* for this event).

***Mn*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

***Ofn, Ocn, Hys*** are expressed in dB.

***Thresh*** is expressed in the same unit as ***Mn***.

NOTE: The definition of Event A4 also applies to CondEvent A4.

#### 5.5.4.6 Event A5 (SpCell becomes worse than threshold1 and neighbour becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition A5-1 and condition A5-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A5-3 or condition A5-4, i.e. at least one of the two, as specified below, is fulfilled;

1> use the SpCell for *Mp*.

NOTE 1: The parameters of the reference signal(s) of the cell(s) that triggers the event are indicated in the *measObjectNR* associated to the event which may be different from the *measObjectNR* of the NR SpCell.

Inequality A5-1 (Entering condition 1)

*Mp + Hys < Thresh1*

Inequality A5-2 (Entering condition 2)

*Mn + Ofn + Ocn – Hys > Thresh2*

Inequality A5-3 (Leaving condition 1)

*Mp – Hys > Thresh1*

Inequality A5-4 (Leaving condition 2)

*Mn + Ofn + Ocn + Hys < Thresh2*

The variables in the formula are defined as follows:

***Mp*** is the measurement result of the NR SpCell, not taking into account any offsets.

***Mn*** is the measurement result of the neighbouring cell, not taking into account any offsets.

***Ofn*** is the measurement object specific offset of the neighbour cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the neighbour cell).

***Ocn*** is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the neighbour cell), and set to zero if not configured for the neighbour cell.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Thresh1*** is the threshold parameter for this event (i.e. *a5-Threshold1* as defined within *reportConfigNR* for this event).

***Thresh2*** is the threshold parameter for this event (i.e. *a5-Threshold2* as defined within *reportConfigNR* for this event).

***Mn, Mp*** are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

***Ofn, Ocn, Hys*** are expressed in dB.

***Thresh1***is expressed in the same unit as ***Mp***.

***Thresh2*** is expressed in the same unit as ***Mn***.

NOTE 2: The definition of Event A5 also applies to CondEvent A5.

#### 5.5.4.7 Event A6 (Neighbour becomes offset better than SCell)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A6-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A6-2, as specified below, is fulfilled;

1> for this measurement, consider the (secondary) cell corresponding to the *measObjectNR* associated to this event to be the serving cell.

NOTE: The reference signal(s) of the neighbour(s) and the reference signal(s) of the SCell are both indicated in the associated *measObjectNR*.

Inequality A6-1 (Entering condition)

*Mn + Ocn – Hys > Ms + Ocs + Off*

Inequality A6-2 (Leaving condition)

*Mn + Ocn + Hys < Ms + Ocs + Off*

The variables in the formula are defined as follows:

***Mn*** is the measurement result of the neighbouring cell, not taking into account any offsets.

***Ocn*** is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within the associated *measObjectNR*), and set to zero if not configured for the neighbour cell.

***Ms*** is the measurement result of the serving cell, not taking into account any offsets.

***Ocs*** is the cell specific offset of the serving cell (i.e. *cellIndividualOffset* as defined within the associated *measObjectNR*), and is set to zero if not configured for the serving cell.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Off*** is the offset parameter for this event (i.e. *a6-Offset* as defined within *reportConfigNR* for this event).

***Mn, Ms*** are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

***Ocn, Ocs, Hys, Off*** are expressed in dB.

#### 5.5.4.8 Event B1 (Inter RAT neighbour becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition B1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition B1-2, as specified below, is fulfilled.

Inequality B1-1 (Entering condition)

*Mn + Ofn + Ocn – Hys > Thresh*

Inequality B1-2 (Leaving condition)

*Mn + Ofn + Ocn + Hys < Thresh*

The variables in the formula are defined as follows:

***Mn*** is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets.

***Ofn*** is the measurement object specific offset of the frequency of the inter-RAT neighbour cell (i.e. *eutra-Q-OffsetRange* as defined within the *measObjectEUTRA* corresponding to the frequency of the neighbour inter-RAT cell, *utra-FDD-Q-OffsetRange* as defined within the *measObjectUTRA-FDD* corresponding to the frequency of the neighbour inter-RAT cell).

***Ocn*** is the cell specific offset of the inter-RAT neighbour cell (i.e. *cellIndividualOffset* as defined within the *measObjectEUTRA* corresponding to the neighbour inter-RAT cell), and set to zero if not configured for the neighbour cell.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigInterRAT* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *b1-ThresholdEUTRA* as defined within *reportConfigInterRAT* for this event, *b1-ThresholdUTRA-FDD* as defined for UTRA-FDD within *reportConfigInterRAT* for this event).

***Mn*** is expressed in dBm or in dB, depending on the measurement quantity of the inter-RAT neighbour cell.

***Ofn, Ocn, Hys*** are expressed in dB.

***Thresh*** is expressed in the same unit as ***Mn***.

#### 5.5.4.9 Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition B2-1 and condition B2-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition B2-3 or condition B2-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality B2-1 (Entering condition 1)

*Mp + Hys < Thresh1*

Inequality B2-2 (Entering condition 2)

*Mn + Ofn + Ocn – Hys > Thresh2*

Inequality B2-3 (Leaving condition 1)

*Mp – Hys > Thresh1*

Inequality B2-4 (Leaving condition 2)

*Mn + Ofn + Ocn + Hys < Thresh2*

The variables in the formula are defined as follows:

***Mp*** is the measurement result of the PCell, not taking into account any offsets.

***Mn*** is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets.

***Ofn*** is the measurement object specific offset of the frequency of the inter-RAT neighbour cell (i.e. *eutra-Q-OffsetRange* as defined within the *measObjectEUTRA* corresponding to the frequency of the inter-RAT neighbour cell, *utra-FDD-Q-OffsetRange* as defined within the *measObjectUTRA-FDD* corresponding to the frequency of the neighbour inter-RAT cell).

***Ocn*** is the cell specific offset of the inter-RAT neighbour cell (i.e. *cellIndividualOffset* as defined within the *measObjectEUTRA* corresponding to the neighbour inter-RAT cell), and set to zero if not configured for the neighbour cell.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigInterRAT* for this event).

***Thresh1*** is the threshold parameter for this event (i.e. b2*-Threshold1* as defined within *reportConfigInterRAT* for this event).

***Thresh2*** is the threshold parameter for this event (i.e. *b2-Threshold2EUTRA* as defined within *reportConfigInterRAT* for this event, *b2-Threshold2UTRA-FDD* as defined for UTRA-FDD within *reportConfigInterRAT* for this event).

***Mp*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ and SINR.

***Mn*** is expressed in dBm or dB, depending on the measurement quantity of the inter-RAT neighbour cell.

***Ofn, Ocn, Hys*** are expressed in dB.

***Thresh1*** is expressed in the same unit as ***Mp***.

***Thresh2*** is expressed in the same unit as ***Mn***.

#### 5.5.4.10 Event I1 (Interference becomes higher than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition I1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition I1-2, as specified below, is fulfilled.

Inequality I1-1 (Entering condition)

*Mi* – *Hys > Thresh*

Inequality I1-2 (Leaving condition)

*Mi+ Hys < Thresh*

The variables in the formula are defined as follows:

***Mi*** is the measurement result of the interference, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *i1-Threshold* as defined within *reportConfigNR* for this event).

***Mi, Thresh*** are expressed in dBm.

***Hys*** is expressed in dB.

#### 5.5.4.11 Event C1 (The NR sidelink channel busy ratio is above a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition C1-2, as specified below, is fulfilled;

Inequality C1-1 (Entering condition)



Inequality C1-2 (Leaving condition)



The variables in the formula are defined as follows:

***Ms*** is the measurement result of channel busy ratio of the transmission resource pool, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR-SL* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *c1-Threshold* as defined within *reportConfigNR-SL* for this event).

***Ms*** is expressed in decimal from 0 to 1 in steps of 0.01.

***Hys*** is expressed is in the same unit as ***Ms***.

***Thresh*** is expressed in the same unit as ***Ms***.

#### 5.5.4.12 Event C2 (The NR sidelink channel busy ratio is below a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition C2-2, as specified below, is fulfilled;

Inequality C2-1 (Entering condition)



Inequality C2-2 (Leaving condition)



The variables in the formula are defined as follows:

***Ms*** is the measurement result of channel busy ratio of the transmission resource pool, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR-SL* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *c2-Threshold* as defined within *reportConfigNR-SL* for this event).

***Ms*** is expressed in decimal from 0 to 1 in steps of 0.01.

***Hys*** is expressed is in the same unit as ***Ms***.

***Thresh*** is expressed in the same unit as ***Ms***.

#### 5.5.4.13 Void

#### 5.5.4.14 Void

#### 5.5.4.15 Event D1

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition D1-1 and condition D1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition D1-3 or condition D1-4, i.e. at least one of the two, as specified below, are fulfilled;

Inequality D1-1 (Entering condition 1)

Inequality D1-2 (Entering condition 2)

Inequality D1-3 (Leaving condition 1)

Inequality D1-4 (Leaving condition 2)

The variables in the formula are defined as follows:

***Ml1*** is the UE location, represented by the distance between UE and a reference location parameter for this event (i.e. *referenceLocation1* as defined within *reportConfigNR* for this event), not taking into account any offsets.

***Ml2*** is the UE location, represented by the distance between UE and a reference location parameter for this event (i.e. *referenceLocation2* as defined within *reportConfigNR* for this event), not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigNR* for this event).

***Thresh1*** is the threshold for this event defined as a distance, configured with parameter *distanceThreshFromReference1,* from a reference location configured with parameter *referenceLocation1* within *reportConfigNR* for this event.

***Thresh2*** is the threshold for this event defined as a distance, configured with parameter *distanceThreshFromReference2,* from a reference location configured with parameter *referenceLocation2* within *reportConfigNR* for this event.

***Ml1*** is expressed in meters.

***Ml2*** is expressed in the same unit as ***Ml1***.

***Hys*** is expressed in the same unit as ***Ml1.***

***Thresh1*** is expressed in the same unit as ***Ml1***.

***Thresh2*** is expressed in the same unit as ***Ml1***.

NOTE: The definition of Event D1 also applies to CondEvent D1.

#### 5.5.4.16 CondEvent T1

The UE shall:

1> consider the entering condition for this event to be satisfied when condition T1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition T1-2, as specified below, is fulfilled;

Inequality T1-1 (Entering condition)

Inequality T1-2 (Leaving condition)

The variables in the formula are defined as follows:

***Mt*** is the time measured at UE.

***Thresh1*** is the threshold parameter for this event (i.e. *t1-Threshold* as defined within *reportConfigNR* for this event).

***Duration*** is the duration parameter for this event (i.e. *duration* as defined within *reportConfigNR* for this event).

***Mt*** is expressed in *ms*.

***Thresh1*** is expressed in the same unit as ***Mt***.

***Duration*** is expressed in the same unit as ***Mt***.

#### 5.5.4.17 Event X1 (Serving L2 U2N Relay UE becomes worse than threshold1 and NR Cell becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition X1-1 and condition X1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition X1-3 or condition X1-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality X1-1 (Entering condition 1)

*Mr + Hys < Thresh1*

Inequality X1-2 (Entering condition 2)

*Mn + Ofn + Ocn – Hys > Thresh2*

Inequality X1-3 (Leaving condition 1)

*Mr – Hys > Thresh1*

Inequality X1-4 (Leaving condition 2)

*Mn + Ofn + Ocn + Hys < Thresh2*

The variables in the formula are defined as follows:

***Mr*** is the measurement result of the serving L2 U2N Relay UE, not taking into account any offsets.

***Mn*** is the measurement result of the NR cell, not taking into account any offsets.

***Ofn*** is the measurement object specific offset of the reference signal of the NR cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the NR cell).

***Ocn*** is the cell specific offset of the NR cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the frequency of the NR cell), and set to zero if not configured for the cell.

***Hys*** is the hysteresis parameter for this event.

***Thresh1*** is the threshold parameter for this event (i.e. *x1-Threshold1-Relay* as defined within *reportConfigNR* for this event).

***Thresh2*** is the threshold parameter for this event (i.e. *x1-Threshold2* as defined within *reportConfigNR* for this event).

***Mr*** is expressed in dBm.

***Mn*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

***Ofn, Ocn, Hys*** are expressed in dB.

***Thresh1*** is expressed in the same unit as ***Mr***.

***Thresh2*** is expressed in the same unit as ***Mn***.

#### 5.5.4.18 Event X2 (Serving L2 U2N Relay UE becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition X2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition X2-2, as specified below, is fulfilled;

Inequality X2-1 (Entering condition)

*Mr + Hys < Thresh*

Inequality X2-2 (Leaving condition)

*Mr – Hys > Thresh*

The variables in the formula are defined as follows:

***Mr*** is the measurement result of the serving L2 U2N Relay UE, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event.

***Thresh*** is the threshold parameter for this event (i.e. *x2-Threshold-Relay* as defined within *reportConfigNR* for this event).

***Mr*** is expressed in dBm.

***Hys*** are expressed in dB.

***Thresh*** is expressed in the same unit as ***Mr***.

#### 5.5.4.19 Event Y1 (PCell becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition Y1-1 and condition Y1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition Y1-3 or condition Y1-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality Y1-1 (Entering condition 1)

*Mp + Hys < Thresh1*

Inequality Y1-2 (Entering condition 2)

*Mr– Hys > Thresh2*

Inequality Y1-3 (Leaving condition 1)

*Mp – Hys > Thresh1*

Inequality Y1-4 (Leaving condition 2)

*Mr + Hys < Thresh2*

The variables in the formula are defined as follows:

***Mp*** is the measurement result of the PCell, not taking into account any offsets.

***Mr*** is the measurement result of the candidate L2 U2N Relay UE, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigInterRAT* for this event).

***Thresh1*** is the threshold parameter for this event (i.e. *y1-Threshold1* as defined within *reportConfigInterRAT* for this event).

***Thresh2*** is the threshold parameter for this event (i.e. *y1-Threshold2-Relay* as defined within *reportConfigInterRAT* for this event).

***Mp*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ and SINR.

***Mr*** is expressed in dBm or dB, depending on the measurement quantity of candidate L2 U2N Relay UE.

***Hys*** are expressed in dB.

***Thresh1*** is expressed in the same unit as ***Mp***.

***Thresh2*** is expressed in the same unit as ***Mr***.

#### 5.5.4.20 Event Y2 (Candidate L2 U2N Relay UE becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition Y2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition Y2-2, as specified below, is fulfilled;

Inequality Y2-1 (Entering condition)

*Mr– Hys > Thresh2*

Inequality Y2-2 (Leaving condition)

*Mr + Hys < Thresh2*

The variables in the formula are defined as follows:

***Mr*** is the measurement result of the candidate L2 U2N Relay UE, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigInterRAT* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *y2-Threshold-Relay* as defined within *reportConfigInterRAT* for this event).

***Mr*** is expressed in dBm or dB, depending on the measurement quantity of candidate L2 U2N Relay UE.

***Hys*** are expressed in dB.

***Thresh*** is expressed in the same unit as ***Mr***.

### 5.5.5 Measurement reporting

#### 5.5.5.1 General



Figure 5.5.5.1-1: Measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to the network. The UE shall initiate this procedure only after successful AS security activation.

For the *measId* for which the measurement reporting procedure was triggered, the UE shall set the *measResults* within the *MeasurementReport* message as follows:

1> set the *measId* to the measurement identity that triggered the measurement reporting;

1> for each serving cell configured with *servingCellMO*:

2> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *rsType*:

3> if the serving cell measurements based on the *rsType* included in the *reportConfig* that triggered the measurement report are available:

4> set the *measResultServingCell* within *measResultServingMOList* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on the *rsType* included in the *reportConfig* that triggered the measurement report;

2> else:

3> if SSB based serving cell measurements are available:

4> set the *measResultServingCell* within *measResultServingMOList* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on SSB;

3> else if CSI-RS based serving cell measurements are available:

4> set the *measResultServingCell* within *measResultServingMOList* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on CSI-RS;

1> set the *servCellId* within *measResultServingMOList* to include each NR serving cell that is configured with *servingCellMO*, if any;

1> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:

2> for each serving cell configured with *servingCellMO*, include beam measurement information according to the associated *reportConfig* as described in 5.5.5.2;

1> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportAddNeighMeas*:

2> for each *measObjectId* referenced in the *measIdList* which is also referenced with *servingCellMO*, other than the *measObjectId* corresponding with the *measId* that triggered the measurement reporting:

3> if the *measObjectNR* indicated by the *servingCellMO* includes the RS resource configuration corresponding to the *rsType* indicated in the *reportConfig*:

4> set the *measResultBestNeighCell* within *measResultServingMOList* to include the *physCellId* and the available measurement quantities based on the *reportQuantityCell* and *rsType* indicated in *reportConfig* of the non-serving cell corresponding to the concerned *measObjectNR* with the highest measured RSRP if RSRP measurement results are available for cells corresponding to this *measObjectNR*, otherwise with the highest measured RSRQ if RSRQ measurement results are available for cells corresponding to this *measObjectNR*, otherwise with the highest measured SINR;

4> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport:*

5> for each best non-serving cell included in the measurement report:

6> include beam measurement information according to the associated *reportConfig* as described in 5.5.5.2;

1> if the *reportConfig* associated with the *measId* that triggered the measurement reporting is set to *eventTriggered* and *eventID* is set to *eventA3*, or *eventA4*, or *eventA5*, or *eventB1*, or *eventB2*:

2> if the UE is in NE-DC and the measurement configuration that triggered this measurement report is associated with the MCG:

3> set the *measResultServFreqListEUTRA-SCG* to include an entry for each E-UTRA SCG serving frequency with the following:

4> include *carrierFreq* of the E-UTRA serving frequency;

4> set the *measResultServingCell* to include the available measurement quantities that the UE is configured to measure by the measurement configuration associated with the SCG;

4> if *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportAddNeighMeas*:

5> set the *measResultServFreqListEUTRA-SCG* to include within *measResultBestNeighCell* the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;

1> if *reportConfig* associated with the *measId* that triggered the measurement reporting is set to *eventTriggered* and *eventID* is set to *eventA3*, or *eventA4*, or *eventA5*:

2> if the UE is in NR-DC and the measurement configuration that triggered this measurement report is associated with the MCG:

3> set the *measResultServFreqListNR-SCG* to include for each NR SCG serving cell that is configured with *servingCellMO*, if any, the following:

4> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *rsType*:

5> if the serving cell measurements based on the *rsType* included in the *reportConfig* that triggered the measurement report are available according to the measurement configuration associated with the SCG:

6> set the *measResultServingCell* within *measResultServFreqListNR-SCG* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on the *rsType* included in the *reportConfig* that triggered the measurement report;

4> else:

5> if SSB based serving cell measurements are available according to the measurement configuration associated with the SCG:

6> set the *measResultServingCell* within *measResultServFreqListNR-SCG* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on SSB;

5> else if CSI-RS based serving cell measurements are available according to the measurement configuration associated with the SCG:

6> set the *measResultServingCell* within *measResultServFreqListNR-SCG* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on CSI-RS;

4> if results for the serving cell derived based on SSB are included:

5> include the *ssbFrequency* to the value indicated by ssbFrequency as included in the *MeasObjectNR* of the serving cell;

4> if results for the serving cell derived based on CSI-RS are included:

5> include the *refFreqCSI-RS* to the value indicated by *refFreqCSI-RS* as included in the *MeasObjectNR* of the serving cell;

4> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:

5> for each serving cell configured with *servingCellMO*, include beam measurement information according to the associated *reportConfig* as described in 5.5.5.2, where availability is considered according to the measurement configuration associated with the SCG;

4> if *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportAddNeighMeas*:

5> if the *measObjectNR* indicated by the *servingCellMO* includes the RS resource configuration corresponding to the *rsType* indicated in the *reportConfig*:

6> set the *measResultBestNeighCellListNR* within *measResultServFreqListNR-SCG* to include one entry with the *physCellId* and the available measurement quantities based on the *reportQuantityCell* and *rsType* indicated in *reportConfig* of the non-serving cell corresponding to the concerned *measObjectNR* with the highest measured RSRP if RSRP measurement results are available for cells corresponding to this *measObjectNR*, otherwise with the highest measured RSRQ if RSRQ measurement results are available for cells corresponding to this *measObjectNR*, otherwise with the highest measured SINR, where availability is considered according to the measurement configuration associated with the SCG;

7> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport:*

8> for each best non-serving cell included in the measurement report:

9> include beam measurement information according to the associated *reportConfig* as described in 5.5.5.2, where availability is considered according to the measurement configuration associated with the SCG;

1> if the *measRSSI-ReportConfig* is configured within the corresponding *reportConfig* for this *measId*:

2> set the *rssi-Result* to the linear average of sample value(s) provided by lower layers in the *reportInterval;*

2> set the *channelOccupancy* to the rounded percentage of sample values which are beyond the *channelOccupancyThreshold* within all the sample values in the *reportInterval;*

1> if the UE is acting as L2 U2N Remote UE:

2> set the *sl-MeasResultServingRelay* to include the SL-RSRP of the serving L2 U2N Relay UE;

2> set the *cellIdentity* to include the *cellAccessRelatedInfo* contained in the discovery message received from the serving L2 U2N Relay UE;

2> set the *sl-RelayUE-Identity* to include the Source L2 ID of the serving L2 U2N Relay;

NOTE 1: In case of no data transmission from L2 U2N Relay UE to L2 U2N Remote UE, it is left to UE implementation whether to use SL-RSRP or SD-RSRP when setting the *sl-MeasResultServingRelay* of the serving L2 U2N Relay UE.

1> if there is at least one applicable neighbouring cell or candidate L2 U2N Relay UE to report:

2> if the *reportType* is set to *eventTriggered* or *periodical*:

3> if the measurement report concerns the candidate L2 U2N Relay UE:

4> set the *sl-MeasResultsCandRelay* in *measResultNeighCells* to include the best candidate L2 U2N Relay UEs up to *maxReportCells* in accordance with the following:

5> if the *reportType* is set to *eventTriggered*:

6> include the L2 U2N Relay UEs included in the *relaysTriggeredList* as defined within the *VarMeasReportList* for this *measId*;

5> else:

6> include the applicable L2 U2N Relay UEs for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

5> for each L2 U2N Relay UE that is included in the *sl-MeasResultsCandRelay*:

6> set the *cellIdentity* to include the *cellAccessRelatedInfo* contained in the discovery message received from the concerned L2 U2N Relay UE;

6> set the *sl-RelayUE-Identity* to include the Source L2 ID of the concerned L2 U2N Relay UE;

5> for each included L2 U2N Relay UE, include the layer 3 filtered measured results in accordance with the *reportConfig* for this *measId*, ordered as follows:

6> set the *sl-MeasResult* to include the quantity(ies) indicated in the *reportQuantityRelay* within the concerned *reportConfigRelay* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best L2 U2N Relay UE is included first;

3> else:

4> set the *measResultNeighCells* to include the best neighbouring cells up to *maxReportCells* in accordance with the following:

5> if the *reportType* is set to *eventTriggered* and *eventId* is not set to *eventD1*:

6> include the cells included in the *cellsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;

5> else:

6> include the applicable cells for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

5> for each cell that is included in the *measResultNeighCells*, include the *physCellId*;

5> if the reportType is set to eventTriggered or periodical:

6> for each included cell, include the layer 3 filtered measured results in accordance with the *reportConfig* for this *measId*, ordered as follows:

7> if the *measObject* associated with this *measId* concerns NR:

8> if *rsType* in the associated *reportConfig* is set to *ssb*:

9> set *resultsSSB-Cell* within the *measResult* to include the SS/PBCH block based quantity(ies) indicated in the *reportQuantityCell* within the concerned *reportConfig*, in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;

9> if *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport* are configured, include beam measurement information as described in 5.5.5.2;

8> else if *rsType* in the associated *reportConfig* is set to *csi-rs*:

9> set *resultsCSI-RS-Cell* within the *measResult* to include the CSI-RS based quantity(ies) indicated in the *reportQuantityCell* within the concerned *reportConfig*, in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;

9> if *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport* are configured, include beam measurement information as described in 5.5.5.2;

7> if the *measObject* associated with this *measId* concerns E-UTRA:

8> set the *measResult* to include the quantity(ies) indicated in the *reportQuantity* within the concerned *reportConfigInterRAT* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;

7> if the *measObject* associated with this *measId* concerns UTRA-FDD and if *ReportConfigInterRAT* includes the *reportQuantityUTRA-FDD*:

8> set the *measResult* to include the quantity(ies) indicated in the *reportQuantityUTRA-FDD* within the concerned *reportConfigInterRAT* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;

2> else:

3> if the cell indicated by *cellForWhichToReportCGI* is an NR cell:

4> if *plmn-IdentityInfoList* of the *cgi-Info* for the concerned cell has been obtained:

5> include the *plmn-IdentityInfoList* including *plmn-IdentityList*, *trackingAreaCode* (if available), *trackingAreaList* (if available)*, ranac* (if available), *cellIdentity* and *cellReservedForOperatorUse* for each entry of the *plmn-IdentityInfoList*;

5> include *frequencyBandList* if available;

5> for each *PLMN-IdentityInfo* in *plmn-IdentityInfoList*:

6> if the *gNB-ID-Length* is broadcast:

7> include *gNB-ID-Length*;

4> if *nr-CGI-Reporting-NPN* is supported by the UE and *npn-IdentityInfoList* of the *cgi-Info* for the concerned cell has been obtained:

5> include the *npn-IdentityInfoList* including *npn-IdentityList*, *trackingAreaCode*, *ranac* (if available), *cellIdentity* and *cellReservedForOperatorUse* for each entry of the *npn-IdentityInfoList*;

5> for each *NPN-IdentityInfo* in *NPN-IdentityInfoList*:

6> if the *gNB-ID-Length* is broadcast:

7> include *gNB-ID-Length*;

5> include *cellReservedForOtherUse* if available;

4> else if *MIB* indicates the *SIB1* is not broadcast:

5> include the *noSIB1* including the *ssb-SubcarrierOffset* and *pdcch-ConfigSIB1* obtained from *MIB* of the concerned cell;

3> if the cell indicated by *cellForWhichToReportCGI* is an E-UTRA cell:

4> if all mandatory fields of the *cgi-Info-EPC* for the concerned cell have been obtained:

5> include in the *cgi-Info-EPC* the fields broadcasted in E-UTRA *SystemInformationBlockType1* associated to EPC;

4> if the UE is E-UTRA/5GC capable and all mandatory fields of the *cgi-Info-5GC* for the concerned cell have been obtained:

5> include in the *cgi-Info-5GC* the fields broadcasted in E-UTRA *SystemInformationBlockType1* associated to 5GC;

4> if the mandatory present fields of the *cgi-Info* for the cell indicated by the *cellForWhichToReportCGI* in the associated *measObject* have been obtained:

5> include the *freqBandIndicator*;

5> if the cell broadcasts the *multiBandInfoList*, include the *multiBandInfoList*;

5> if the cell broadcasts the *freqBandIndicatorPriority*, include the *freqBandIndicatorPriority*;

1> if the corresponding *measObject* concerns NR:

2> if the *reportSFTD-Meas* is set to *true* within the corresponding *reportConfigNR* for this *measId*:

3> set the *measResultSFTD-NR* in accordance with the following:

4> set *sfn-OffsetResult* and *frameBoundaryOffsetResult* to the measurement results provided by lower layers;

4> if the *reportRSRP* is set to *true*;

5> set *rsrp-Result* to the RSRP of the NR PSCell derived based on SSB;

2> else if the *reportSFTD-NeighMeas* is included within the corresponding *reportConfigNR* for this *measId*:

3> for each applicable cell which measurement results are available, include an entry in the *measResultCellListSFTD-NR* and set the contents as follows:

4> set *physCellId* to the physical cell identity of the concerned NR neighbour cell.

4> set *sfn-OffsetResult* and *frameBoundaryOffsetResult* to the measurement results provided by lower layers;

4> if the *reportRSRP* is set to *true*:

5> set *rsrp-Result* to the RSRP of the concerned cell derived based on SSB;

1> else if the corresponding *measObject* concerns E-UTRA:

2> if the *reportSFTD-Meas* is set to *true* within the corresponding *reportConfigInterRAT* for this *measId*:

3> set the *measResultSFTD-EUTRA* in accordance with the following:

4> set *sfn-OffsetResult* and *frameBoundaryOffsetResult* to the measurement results provided by lower layers;

4> if the *reportRSRP* is set to *true*;

5> set *rsrpResult-EUTRA* to the RSRP of the EUTRA PSCell;

1> if average uplink PDCP delay values are available:

2> set the *ul-PDCP-DelayValueResultList* to include the corresponding average uplink PDCP delay values;

1> if PDCP excess delay measurements are available:

2> set the *ul-PDCP-ExcessDelayResultList* to include the corresponding PDCP excess delay measurements;

1> if the *includeCommonLocationInfo* is configured in the corresponding *reportConfig* for this *measId* and detailed location information that has not been reported is available, set the content of *commonLocationInfo* of the *locationInfo* as follows:

2> include the *locationTimestamp*;

2> include the *locationCoordinate*, if available;

2> include the *velocityEstimate*, if available;

2> include the *locationError*, if available;

2> include the *locationSource*, if available;

2> if available, include the *gnss-TOD-msec*,

1> if the *coarseLocationRequest* is set to *true* in the corresponding *reportConfig* for this *measId*:

2> if available, include *coarseLocationInfo;*

1> if the *includeWLAN-Meas* is configured in the corresponding *reportConfig* for this *measId*, set the *wlan-LocationInfo* of the *locationInfo* in the *measResults* as follows:

2> if available, include the *LogMeasResultWLAN*, in order of decreasing RSSI for WLAN APs;

1> if the *includeBT-Meas* is configured in the corresponding *reportConfig* for this *measId*, set the *BT-LocationInfo* of the *locationInfo* in the *measResults* as follows:

2> if available, include the *LogMeasResultBT*, in order of decreasing RSSI for Bluetooth beacons;

1> if the *includeSensor-Meas* is configured in the corresponding *reportConfig* for this *measId*, set the *sensor-LocationInfo* of the *locationInfo* in the *measResults* as follows:

2> if available, include the *sensor-MeasurementInformation*;

2> if available, include the *sensor-MotionInformation*;

1> if there is at least one applicable transmission resource pool for NR sidelink communication/discovery (for *measResultsSL*):

2> set the *measResultsListSL* to include the CBR measurement results in accordance with the following:

3> if the *reportType* is set to *eventTriggered*:

4> include the transmission resource pools included in the *poolsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;

3> else:

4> include the applicable transmission resource pools for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

3> if the corresponding *measObject* concerns NR sidelink communication/discovery, then for each transmission resource pool to be reported:

4> set the *sl-poolReportIdentity* to the identity of this transmission resource pool;

4> set the *sl-CBR-ResultsNR* to the CBR measurement results on PSSCH and PSCCH of this transmission resource pool provided by lower layers, if available;

NOTE 1: Void.

1> if there is at least one applicable CLI measurement resource to report:

2> if the *reportType* is set to *cli-EventTriggered* or *cli-Periodical*:

3> set the *measResultCLI* to include the most interfering SRS resources or most interfering CLI-RSSI resources up to *maxReportCLI* in accordance with the following:

4> if the *reportType* is set to *cli-EventTriggered*:

5> if trigger quantity is set to *srs-RSRP* i.e. *i1-Threshold* is set to *srs-RSRP*:

6> include the SRS resource included in the *cli-TriggeredList* as defined within the *VarMeasReportList* for this *measId*;

5> if trigger quantity is set to *cli-RSSI* i.e. *i1-Threshold* is set to *cli-RSSI*:

6> include the CLI-RSSI resource included in the *cli-TriggeredList* as defined within the *VarMeasReportList* for this *measId*;

4> else:

5> if *reportQuantityCLI* is set to *srs-rsrp*:

6> include the applicable SRS resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

5> else:

6> include the applicable CLI-RSSI resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

4> for each SRS resource that is included in the *measResultCLI*:

5> include the *srs-ResourceId*;

5> set *srs-RSRP-Result* to include the layer 3 filtered measured results in decreasing order, i.e. the most interfering SRS resource is included first;

4> for each CLI-RSSI resource that is included in the *measResultCLI*:

5> include the *rssi-ResourceId*;

5> set *cli-RSSI-Result* to include the layer 3 filtered measured results in decreasing order, i.e. the most interfering CLI-RSSI resource is included first;

1> if there is at least one applicable UE Rx-Tx time difference measurement to report:

2> set *measResultRxTxTimeDiff* to the latest measurement result;

1> increment the *numberOfReportsSent* as defined within the *VarMeasReportList* for this *measId* by 1;

1> stop the periodical reporting timer, if running;

1> if the *numberOfReportsSent* as defined within the *VarMeasReportList* for this *measId* is less than the *reportAmount* as defined within the corresponding *reportConfig* for this *measId*:

2> start the periodical reporting timer with the value of *reportInterval* as defined within the corresponding *reportConfig* for this *measId*;

1> else:

2> if the *reportType* is set to *periodical* or *cli-Periodical* or *rxTxPeriodical*:

3> remove the entry within the *VarMeasReportList* for this *measId*;

3> remove this *measId* from the *measIdList* within *VarMeasConfig*;

1> if the measurement reporting was configured by a *sl-ConfigDedicatedNR* received within the *RRCConnectionReconfiguration*:

2> submit the *MeasurementReport* message to lower layers for transmission via SRB1, embedded in E-UTRA RRC message *ULInformationTransferIRAT* as specified TS 36.331 [10], clause 5.6.28;

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

2> if SRB3 is configured and the SCG is not deactivated:

3> submit the *MeasurementReport* message via SRB3 to lower layers for transmission, upon which the procedure ends;

2> else:

3> submit the *MeasurementReport* message via E-UTRA embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10].

1> else if the UE is in NR-DC:

2> if the measurement configuration that triggered this measurement report is associated with the SCG:

3> if SRB3 is configured and the SCG is not deactivated:

4> submit the *MeasurementReport* message via SRB3 to lower layers for transmission, upon which the procedure ends;

3> else:

4> submit the *MeasurementReport* message via SRB1 embedded in NR RRC message *ULInformationTransferMRDC* as specified in5.7.2a.3;

2> else:

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

1> else:

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

#### 5.5.5.2 Reporting of beam measurement information

For beam measurement information to be included in a measurement report the UE shall:

1> if *reportType* is set to *eventTriggered*:

2> consider the trigger quantity as the sorting quantity if available, otherwise RSRP as sorting quantity if available, otherwise RSRQ as sorting quantity if available, otherwise SINR as sorting quantity;

1> if *reportType* is set to *periodical*:

2> if a single reporting quantity is set to *true* in *reportQuantityRS-Indexes*;

3> consider the configured single quantity as the sorting quantity;

2> else:

3> if *rsrp* is set to *true*;

4> consider RSRP as the sorting quantity;

3> else:

4> consider RSRQ as the sorting quantity;

1> set *rsIndexResults* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes or CSI-RS indexes in order of decreasing sorting quantity as follows:

2> if the measurement information to be included is based on SS/PBCH block:

3> include within *resultsSSB-Indexes* the index associated to the best beam for that SS/PBCH block sorting quantity and if *absThreshSS-BlocksConsolidation* is included in the *VarMeasConfig* for the *measObject* associated to the cell for which beams are to be reported, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;

3> if *includeBeamMeasurements* is set to *true*, include the SS/PBCH based measurement results for the quantities in *reportQuantityRS-Indexes* for each SS/PBCH block index;

2> else if the beam measurement information to be included is based on CSI-RS:

3> include within *resultsCSI-RS-Indexes* the index associated to the best beam for that CSI-RS sorting quantity and, if *absThreshCSI-RS-Consolidation* is included in the *VarMeasConfig* for the *measObject* associated to the cell for which beams are to be reported, the remaining beams whose sorting quantity is above *absThreshCSI-RS-Consolidation*;

3> if *includeBeamMeasurements* is set to *true*, include the CSI-RS based measurement results for the quantities in *reportQuantityRS-Indexes* for each CSI-RS index.

#### 5.5.5.3 Sorting of cell measurement results

The UE shall determine the sorting quantity according to parameters of the *reportConfig* associated with the *measId* that triggered the reporting:

1> if the *reportType* is set to *eventTriggered*:

2> for an NR cell, consider the quantity used in the *aN-Threshold* (for *eventA1*, *eventA2* and *eventA4*) or in the *a5-Threshold2* (for *eventA5*) or in the *aN-Offset* (for *eventA3* and *eventA6*) as the sorting quantity;

2> for an E-UTRA cell, consider the quantity used in the *bN-ThresholdEUTRA* as the sorting quantity;

2> for an UTRA-FDD cell, consider the quantity used in the *bN-ThresholdUTRA-FDD* as the sorting quantity;

2> for a candidate L2 U2N Relay UE, consider the y*N-Threshold2-Relay* as the sorting quantity;

1> if the *reportType* is set to *periodical*:

2> determine the sorting quantity according to *reportQuantityCell* for an NR cell, and according to *reportQuantity* for an E-UTRA cell, as below:

3> if a single quantity is set to *true*:

4> consider this quantity as the sorting quantity;

3> else:

4> if *rsrp* is set to *true*;

5> consider RSRP as the sorting quantity;

4> else:

5> consider RSRQ as the sorting quantity;

2> determine the sorting quantity according to *reportQuantityUTRA-FDD* for UTRA-FDD cell, as below:

3> if a single quantity is set to *true*:

4> consider this quantity as the sorting quantity;

3> else:

4> consider RSCP as the sorting quantity.

2> for a candidate L2 U2N Relay UE, consider the *reportQuantityRelay* as the sorting quantity;

### 5.5.6 Location measurement indication

#### 5.5.6.1 General



Figure 5.5.5.1-1: Location measurement indication

The purpose of this procedure is to indicate to the network that the UE is going to start/stop location related measurements towards E-UTRA or NR (*eutra-RSTD, nr-RSTD, nr-UE-RxTxTimeDiff, nr-PRS-RSRP*) which require measurement gaps or start/stop detection of subframe and slot timing towards E-UTRA (*eutra-FineTimingDetection)* which requires measurement gaps. UE shall initiate this procedure only after successful AS security activation.

NOTE: It is a network decision to configure the measurement gap.

#### 5.5.6.2 Initiation

The UE shall:

1> if and only if upper layers indicate to start performing location measurements towards E-UTRA or NR or start subframe and slot timing detection towards E-UTRA, and the UE requires measurement gaps for these operations while measurement gaps are either not configured or not sufficient:

2> if preconfigured measurement gaps for positioning are configured and the UE considers that at least one of the preconfigured gaps for positioning is sufficient for the location measurement when activated:

3> trigger the lower layers to initiate the measurement gap activation request using UL MAC CE as specified in TS 38.321 [6];

2> else:

3> initiate the procedure to indicate start as specified in clause 5.5.6.3;

NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency of the target RAT if the provided measurement gaps are insufficient.

NOTE 1a: When indication is received from upper layers for performing location measurement and there is pre-configured measurement gap configured (not preconfigured measurement gap for positioning), the UE considers this preconfigured measurement gap to be not sufficient if the measurement gap is not considered to be always activated according to clause 9.1.7.2 of TS 38.133 [14].

1> if and only if upper layers indicate to stop performing location measurements towards E-UTRA or NR or stop subframe and slot timing detection towards E-UTRA:

2> if there is no activated preconfigured measurement gap for positioning:

3> initiate the procedure to indicate stop as specified in 5.5.6.3.

2> else if there is activated preconfigured measurement gap for positioning:

3> trigger the lower layers to deactivate all the activated measurement gap(s) for positioning as specified in TS 38.321 [6].

NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.

#### 5.5.6.3 Actions related to transmission of *LocationMeasurementIndication* message

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

1> if the procedure is initiated to indicate start of location related measurements:

2> if the procedure is initiated for RSTD measurements towards E-UTRA:

3> set the *measurementIndication* to the *eutra-RSTD* according to the information received from upper layers;

2> else if the procedure is initiated for positioning measurement towards NR:

3> set the *measurementIndication* to the *nr-PRS-Measurement* according to the information received from upper layers;

1> else if the procedure is initiated to indicate stop of location related measurements:

2> set the *measurementIndication* to the value *release*;

1> if the procedure is initiated to indicate start of subframe and slot timing detection towards E-UTRA:

2> set the *measurementIndication* to the value *eutra-FineTimingDetection*;

1> else if the procedure is initiated to indicate stop of subframe and slot timing detection towards E-UTRA:

2> set the *measurementIndication* to the value *release*;

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

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## 5.6 UE capabilities

### 5.6.1 UE capability transfer

#### 5.6.1.1 General

This clause describes how the UE compiles and transfers its UE capability information upon receiving a UECapabilityEnquiry from the network.



Figure 5.6.1.1-1: UE capability transfer

#### 5.6.1.2 Initiation

The network initiates the procedure to a UE in RRC\_CONNECTED when it needs (additional) UE radio access capability information. The network should retrieve UE capabilities only after AS security activation. Network does not forward UE capabilities that were retrieved before AS security activation to the CN.

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

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

1> if the *ue-CapabilityRAT-RequestList* contains a *UE-CapabilityRAT-Request* with *rat-Type* set to *nr*:

2> include in the *ue-CapabilityRAT-ContainerList* a *UE-CapabilityRAT-Container* of the type *UE-NR-Capability* and with the *rat-Type* set to *nr*;

2> include the *supportedBandCombinationList, featureSets* and *featureSetCombinations* as specified in clause 5.6.1.4;

1> if the *ue-CapabilityRAT-RequestLis*t contains a *UE-CapabilityRAT-Request* with *rat-Type* set to *eutra-nr*:

2> if the UE supports (NG)EN-DC or NE-DC:

3> include in the *ue-CapabilityRAT-ContainerList* a *UE-CapabilityRAT-Container* of the type *UE-MRDC-Capability* and with the *rat-Type* set to *eutra-nr*;

3> include the *supportedBandCombinationList* and *featureSetCombinations* as specified in clause 5.6.1.4;

1> if the *ue-CapabilityRAT-RequestList* contains a *UE-CapabilityRAT-Request* with *rat-Type* set to *eutra*:

2> if the UE supports E-UTRA:

3> include in the *ue-CapabilityRAT-ContainerList* a *ue-CapabilityRAT-Container* of the type *UE-EUTRA-Capability* and with the *rat-Type* set to *eutra* as specified in TS 36.331 [10], clause 5.6.3.3, according to the *capabilityRequestFilter*, if received;

1> if the *ue-CapabilityRAT-RequestList* contains a *UE-CapabilityRAT-Request* with *rat-Type* set to *utra-fdd*:

2> if the UE supports UTRA-FDD:

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

1> if the RRC message segmentation is enabled based on the field *rrc-SegAllowed* received, and the encoded RRC message is larger than the maximum supported size of a PDCP SDU specified in TS 38.323 [5]:

2> initiate the UL message segment transfer procedure as specified in clause 5.7.7;

1> else:

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

#### 5.6.1.4 Setting band combinations, feature set combinations and feature sets supported by the UE

The UE invokes the procedures in this clause if the NR or E-UTRA network requests UE capabilities for *nr*, *eutra-nr* or *eutra*. This procedure is invoked once per requested *rat-Type* (see clause 5.6.1.3 for capability enquiry by the NR network; see TS 36.331 [10], clause 5.6.3.3 for capability enquiry by the E-UTRA network). The UE shall ensure that the feature set IDs are consistent across feature sets, feature set combinations and band combinations in all three UE capability containers that the network queries with the same fields with the same values, i.e. *UE-CapabilityRequestFilterNR,* *UE-CapabilityRequestFilterCommon* and fields in *UECapabilityEnquiry* message (i.e. *requestedFreqBandsNR-MRDC, requestedCapabilityNR, eutra-nr-only* flag, and *requestedCapabilityCommon*)as defined in TS 36.331, where applicable.

NOTE 1: Capability enquiry without *frequencyBandListFilter* is not supported.

NOTE 2: In EN-DC, the gNB needs the capabilities for RAT types *nr* and *eutra-nr* and it uses the *featureSets* in the *UE-NR-Capability* together with the *featureSetCombinations* in the *UE-MRDC-Capability* to determine the NR UE capabilities for the supported MRDC band combinations. Similarly, the eNB needs the capabilities for RAT types *eutra* and *eutra-nr* and it uses the *featureSetsEUTRA* in the *UE-EUTRA-Capability* together with the *featureSetCombinations* in the *UE-MRDC-Capability* to determine the E-UTRA UE capabilities for the supported MRDC band combinations. Hence, the IDs used in the *featureSets* must match the IDs referred to in *featureSetCombinations* across all three containers. The requirement on consistency implies that there are no undefined feature sets and feature set combinations.

NOTE 3: If the UE cannot include all feature sets and feature set combinations due to message size or list size constraints, it is up to UE implementation which feature sets and feature set combinations it prioritizes.

The UE shall:

1> compile a list of "candidate band combinations" according to the filter criteria in *capabilityRequestFilterCommon* (if included), only consisting of bands included in *frequencyBandListFilter*, and prioritized in the order of *frequencyBandListFilter* (i.e. first include band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on), where for each band in the band combination, the parameters of the band do not exceed *maxBandwidthRequestedDL*, *maxBandwidthRequestedUL*, *maxCarriersRequestedDL*, *maxCarriersRequestedUL*, *ca-BandwidthClassDL-EUTRA* or *ca-BandwidthClassUL-EUTRA*, whichever are received;

1> for each band combination included in the list of "candidate band combinations":

2> if the network (E-UTRA) included the *eutra-nr-only* field, or

2> if the requested *rat-Type* is *eutra*:

3> remove the NR-only band combination from the list of "candidate band combinations";

NOTE 4: The (E-UTRA) network may request capabilities for *nr* but indicate with the *eutra-nr-only* flag that the UE shall not include any NR band combinations in the *UE-NR-Capability*. In this case the procedural text above removes all NR-only band combinations from the candidate list and thereby also avoids inclusion of corresponding feature set combinations and feature sets below.

2> if it is regarded as a fallback band combination with the same capabilities of another band combination included in the list of "candidate band combinations", and

2> if this fallback band combination is generated by releasing at least one SCell or uplink configuration of SCell or SUL according to TS 38.306 [26]:

3> remove the band combination from the list of "candidate band combinations";

NOTE 5: Even if the network requests (only) capabilities for *nr*, it may include E-UTRA band numbers in the *frequencyBandListFilter* to ensure that the UE includes all necessary feature sets needed for subsequently requested *eutra-nr* capabilities. At this point of the procedure the list of "candidate band combinations" contains all NR- and/or E-UTRA-NR band combinations that match the filter (*frequencyBandListFilter*) provided by the NW and that match the *eutra-nr-only* flag (if RAT-Type *nr* is requested by E-UTRA). In the following, this candidate list is used to derive the band combinations, feature set combinations and feature sets to be reported in the requested capability container.

1> if the requested *rat-Type* is *nr*:

2> include into *supportedBandCombinationList* as many NR-only band combinations as possible from the list of "candidate band combinations", starting from the first entry;

3> if *srs-SwitchingTimeRequest* is received:

4> if SRS carrier switching is supported;

5> include *srs-SwitchingTimesListNR* for each band combination;

4> set *srs-SwitchingTimeRequested* to *true*;

2> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in *supportedBandCombinationList* according to the previous;

2> compile a list of "candidate feature set combinations" referenced from the list of "candidate band combinations" excluding entries (rows in feature set combinations) with same or lower capabilities;

2> if *uplinkTxSwitchRequest* is received:

3> include into *supportedBandCombinationList-UplinkTxSwitch* as many NR-only band combinations that supported UL TX switching as possible from the list of "candidate band combinations", starting from the first entry;

4> if *srs-SwitchingTimeRequest* is received:

5> if SRS carrier switching is supported;

6> include *srs-SwitchingTimesListNR* for each band combination;

5> set *srs-SwitchingTimeRequested* to true;

3> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in s*upportedBandCombinationList-UplinkTxSwitch* according to the previous;

NOTE 6: This list of "candidate feature set combinations" contains the feature set combinations used for NR-only as well as E-UTRA-NR band combinations. It is used to derive a list of NR feature sets referred to from the feature set combinations in the *UE-NR-Capability* and from the feature set combinations in a *UE-MRDC-Capability* container.

2> if *sidelinkRequest* is received:

3> for a sidelink band combination the UE included in *supportedBandCombinationListSidelinkEUTRA-NR*:

4> if the UE supports partial sensing for a band of the sidelink band combination, include the partial sensing capabilities for the band using the *sl-TransmissionMode2-PartialSensing-r17*;

3> set *sidelinkRequested* to true;

2> include into *featureSets* the feature sets referenced from the "candidate feature set combinations" and may exclude the feature sets with the parameters that exceed any of *maxBandwidthRequestedDL*, *maxBandwidthRequestedUL*, *maxCarriersRequestedDL* or *maxCarriersRequestedUL*, whichever are received;

NOTE X: When the field *sidelinkRequest* is received, the UE shall consider this as a network query for all sidelink, sidelink relay, and sidelink discovery (both for relay and non-relay case) capabilities.

1> else, if the requested *rat-Type* is *eutra-nr*:

2> include into *supportedBandCombinationList* and/or *supportedBandCombinationListNEDC-Only* as many E-UTRA-NR band combinations as possible from the list of "candidate band combinations", starting from the first entry;

3> if *srs-SwitchingTimeRequest* is received:

4> if SRS carrier switching is supported;

5> include *srs-SwitchingTimesListNR* and *srs-SwitchingTimesListEUTRA* for each band combination;

4> set *srs-SwitchingTimeRequested* to *true*;

2> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in *supportedBandCombinationList* according to the previous;

2> if *uplinkTxSwitchRequest* is received:

3> include into *supportedBandCombinationList-UplinkTxSwitch* as many E-UTRA-NR band combinations that supported UL TX switching as possible from the list of "candidate band combinations", starting from the first entry;

4> if *srs-SwitchingTimeRequest* is received:

5> if SRS carrier switching is supported;

6> include *srs-SwitchingTimesListNR* and *srs-SwitchingTimesListEUTRA* for each band combination;

5> set *srs-SwitchingTimeRequested* to true;

3> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in *supportedBandCombinationList-UplinkTxSwitch* according to the previous;

1> else (if the requested *rat-Type* is *eutra*):

2> compile a list of "candidate feature set combinations" referenced from the list of "candidate band combinations" excluding entries (rows in feature set combinations) with same or lower capabilities;

NOTE 7: This list of "candidate feature set combinations" contains the feature set combinations used for E-UTRA-NR band combinations. It is used to derive a list of E-UTRA feature sets referred to from the feature set combinations in a *UE-MRDC-Capability* container.

2> include into *featureSetsEUTRA* (in the *UE-EUTRA-Capability*) the feature sets referenced from the "candidate feature set combinations" and may exclude the feature sets with the parameters that exceed *ca-BandwidthClassDL-EUTRA* or *ca-BandwidthClassUL-EUTRA*, whichever are received;

1> include the received *frequencyBandListFilter* in the field *appliedFreqBandListFilter* of the requested UE capability, except if the requested *rat-Type* is *nr* andthe network included the *eutra-nr-only* field;

1> if the network included *ue-CapabilityEnquiryExt*:

2> include the received *ue-CapabilityEnquiryExt* in the field *receivedFilters*;

#### 5.6.1.5 Void

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## 5.8 Sidelink

### 5.8.1 General

NR sidelink communication consists of unicast, groupcast and broadcast. For unicast, the PC5-RRC connection is a logical connection between a pair of a Source Layer-2 ID and a Destination Layer-2 ID in the AS. The PC5-RRC signalling, as specified in clause 5.8.9, can be initiated after its corresponding PC5 unicast link establishment (TS 23.287 [55]). The PC5-RRC connection and the corresponding sidelink SRBs and sidelink DRB(s) are released when the PC5 unicast link is released as indicated by upper layers.

For each PC5-RRC connection of unicast, one sidelink SRB (i.e. SL-SRB0) is used to transmit the PC5-S message(s) before the PC5-S security has been established. One sidelink SRB (i.e. SL-SRB1) is used to transmit the PC5-S messages to establish the PC5-S security. One sidelink SRB (i.e. SL-SRB2) is used to transmit the PC5-S messages after the PC5-S security has been established, which is protected. One sidelink SRB (i.e. SL-SRB3) is used to transmit the PC5-RRC signalling, which is protected and only sent after the PC5-S security has been established. One sidelink SRB (i.e. SL-SRB4) is used to transmit/receive the NR sidelink discovery messages.

For unicast of NR sidelink communication, AS security comprises of integrity protection of PC5 signalling (SL-SRB1, SL-SRB2 and SL-SRB3) and user data (SL-DRBs), and it further comprises of ciphering of PC5 signaling (SL-SRB1 only for the Direct Link Security Mode Complete message as specified in TS 24.587 [57] for V2X service or TS 24.554 [72] for Proximity-services, SL-SRB2 and SL-SRB3) and user data (SL-DRBs). The ciphering and integrity protection algorithms and parameters for a PC5 unicast link are exchanged by PC5-S messages in the upper layers as specified in TS 33.536 [60], and apply to the corresponding PC5-RRC connection in the AS. Once AS security is activated for a PC5 unicast link in the upper layers as specified in TS 33.536 [60], all messages on SL-SRB2 and SL-SRB3 and/or user data on SL-DRBs of the corresponding PC5-RRC connection are integrity protected and/or ciphered by the PDCP.

For unicast of NR sidelink communication, if the change of the key is indicated by the upper layers as specified in TS 24.587 [57], UE re-establishes the PDCP entity of the SL-SRB1, SL-SRB2, SL-SRB3 and SL-DRBs on the corresponding PC5-RRC connection.

NOTE 1: In case the configurations for NR sidelink communication are acquired via the E-UTRA, the configurations for NR sidelink communication in *SIB12* and *sl-ConfigDedicatedNR* within *RRCReconfiguration* used in clause 5.8 are provided by the configurations in *SystemInformationBlockType28* and *sl-ConfigDedicatedForNR* within *RRCConnectionReconfiguration* as specified in TS 36.331 [10], respectively.

NOTE 2: In this release, there is one-to-one correspondence between the PC5-RRC connection and the PC5 unicast link as specified in TS 38.300[2].

NOTE 3: All SL-DRBs related to the same PC5-RRC connection have the same activation/deactivation setting for ciphering and the same activation/deactivation setting for integrity protection as specified in TS 33.536 [60].

NOTE 4: When integrity check failure concerning SL-SRB1 for a specific destination is detected, the UE sends an indication to the upper layers [57].

### 5.8.2 Conditions for NR sidelink communication/discovery operation

The UE shall perform NR sidelink communication operation only if the conditions defined in this clause are met:

1> if the UE's serving cell is suitable (RRC\_IDLE or RRC\_INACTIVE or RRC\_CONNECTED); and if either the selected cell on the frequency used for NR sidelink communication/discovery operation belongs to the registered or equivalent PLMN as specified in TS 24.587 [57] or the UE is out of coverage on the frequency used for NR sidelink communication/discovery operation as defined in TS 38.304 [20] and TS 36.304 [27]; or

1> if the UE's serving cell (RRC\_IDLE or RRC\_CONNECTED) fulfils the conditions to support NR sidelink communication/discovery in limited service state as specified in TS 23.287 [55]; and if either the serving cell is on the frequency used for NR sidelink communication/discovery operation or the UE is out of coverage on the frequency used for NR sidelink communication/discovery operation as defined in TS 38.304 [20] and TS 36.304 [27]; or

1> if the UE has no serving cell (RRC\_IDLE);

### 5.8.3 Sidelink UE information for NR sidelink communication/discovery

#### 5.8.3.1 General



Figure 5.8.3.1-1: Sidelink UE information for NR sidelink communication/discovery

The purpose of this procedure is to inform the network that the UE:

- is interested or no longer interested to receive or transmit NR sidelink communication/discovery,

- is requesting assignment or release of transmission resource for NR sidelink communication/discovery,

- is reporting QoS parameters and QoS profile(s) related to NR sidelink communication,

- is reporting that a sidelink radio link failure or sidelink RRC reconfiguration failure has been detected,

- is reporting the sidelink UE capability information of the associated peer UE for unicast communication,

- is reporting the RLC mode information of the sidelink data radio bearer(s) received from the associated peer UE for unicast communication,

- is reporting the accepted sidelink DRX configuration received from the associated peer UE for NR sidelink unicast reception,

- is reporting the sidelink DRX assistance information received from the associated peer UE for NR sidelink unicast transmission, when the UE is configured with *sl-ScheduledConfig*,

- is reporting, for NR sidelink groupcast transmission, the sidelink DRX on/off indication for the associated Destination Layer-2 ID,

- is reporting, for NR sidelink groupcast or broadcast reception, the Destination Layer-2 ID and QoS profile associated with its interested services to which sidelink DRX is applied,

- is reporting DRX configuration reject information from its associated peer UE, when the UE is performing NR sidelink unicast transmission with resource allocation mode 1,

- is reporting parameters related to U2N relay operation.

#### 5.8.3.2 Initiation

A UE capable of NR sidelink communication or NR sidelink discovery or NR sidelink U2N relay operation that is in RRC\_CONNECTED may initiate the procedure to indicate it is (interested in) receiving or transmitting NR sidelink communication or NR sidelink discovery or NR sidelink U2N relay operation in several cases including upon successful connection establishment or resuming, upon change of interest, upon changing QoS profiles, upon receiving *UECapabilityInformationSidelink* from the associated peer UE, upon RLC mode information updated from the associated peer UE or upon change to a PCell providing *SIB12* including *sl-ConfigCommonNR*. A UE capable of NR sidelink communication may initiate the procedure to request assignment of dedicated sidelink DRB configuration and transmission resources for NR sidelink communication transmission. A UE capable of NR sidelink communication may initiate the procedure to report to the network that a sidelink radio link failure or sidelink RRC reconfiguration failure has been declared. A UE capable of NR sidelink discovery may initiate the procedure to request assignment of dedicated resources for NR sidelink discovery transmission or NR sidelink discovery reception. A UE capable of U2N relay operation may initiate the procedure to report/update parameters for acting as U2N Relay UE or U2N Remote UE (including L2 Remote UE's source L2 ID).

A UE capable of NR sidelink operation that is in RRC\_CONNECTED may initiate the procedure to report the sidelink DRX configuration received from the associated peer UE for NR sidelink unicast reception, upon accepting the sidelink DRX configuration from the associated peer UE. A UE capable of NR sidelink communication that is in RRC\_CONNECTED and is performing sidelink unicast transmission with resource allocation mode 1 may initiate the procedure to report the sidelink DRX assistance information or the sidelink DRX configuration reject information received from the associated peer UE, upon receiving either of them from the associated peer UE. A UE capable of NR sidelink communication that is performing sidelink groupcast transmission may initiate the procedure to report the sidelink DRX on/off indication for the associated Destination Layer-2 ID.

An UE capable of NR sidelink operation that is in RRC\_CONNECTED may initiate the procedure to report the Destination Layer-2 ID and QoS profile associated with its interested services that sidelink DRX is applied, for NR sidelink groupcast or broadcast reception.

Upon initiating this procedure, the UE shall:

1> if *SIB12* including *sl-ConfigCommonNR* is provided by the PCell:

2> ensure having a valid version of *SIB12* for the PCell;

2> if configured by upper layers to receive NR sidelink communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell:

3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC\_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR*; or

3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedFreqList*; or if the frequency configured by upper layers to receive NR sidelink communication on has changed since the last transmission of the *SidelinkUEInformationNR* message:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink communication reception frequency of interest in accordance with 5.8.3.3;

3> if the UE is performing NR sidelink groupcast transmission and if *sl-DRX-ConfigCommonGC-BC* is included in *SIB12-IEs*:

4> initiate transmission of the *SidelinkUEInformationNR* message to report the Destination Layer-2 ID and sidelink DRX on/off indication for the corresponding destination in accordance with 5.8.3.3;

2> else:

3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-RxInterestedFreqList*:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in NR sidelink communication reception in accordance with 5.8.3.3;

2> if configured by upper layers to transmit non-relay NR sidelink communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell:

3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC\_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR*; or

3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqList*; or if the information carried by the *sl-TxResourceReqList* has changed since the last transmission of the *SidelinkUEInformationNR* message:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink communication transmission resources required by the UE in accordance with 5.8.3.3;

2> else:

3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-TxResourceReqList*:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink communication transmission resources in accordance with 5.8.3.3.

2> if configured by upper layer to receive NR sidelink non-relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-NonRelayDiscovery*:

3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC\_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-NonRelayDiscovery*; or

3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedFreqListDisc*; or if the frequency configured by upper layers to receive NR sidelink L2 U2N relay discovery messages or NR sidelink L3 U2N relay discovery messages on has changed since the last transmission of the *SidelinkUEInformationNR* message:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink discovery reception frequency of interest in accordance with 5.8.3.3;

2> else:

3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-RxInterestedFreqListDisc*:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in NR sidelink discovery messages reception in accordance with 5.8.3.3;

2> if configured by upper layer to receive NR sidelink L2 U2N relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L2U2N-Relay*; or if configured by upper layer to receive NR sidelink L3 U2N relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L3U2N-RelayDiscovery*:

3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC\_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-L2U2N-Relay* in case of L2 U2N relay operation or connected to a PCell providing *SIB12* but not including *sl-L3U2N-RelayDiscovery* in case of L3 U2N relay operation; or

3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedFreqListDisc*; or if the frequency configured by upper layers to receive NR sidelink discovery messages on has changed since the last transmission of the *SidelinkUEInformationNR* message:

4> if the UE is capable of U2N Relay UE, and if *SIB12* includes *sl-RelayUE-ConfigCommon*, and if the U2N Relay UE threshold conditions as specified in 5.8.14.2 are met; or

4> if the UE is selecting a U2N Relay UE / has a selected U2N Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommon*, and if the U2N Remote UE threshold conditions as specified in 5.8.15.2 are met:

5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR relay sidelink discovery reception frequency of interest in accordance with 5.8.3.3;

2> else:

3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-RxInterestedFreqListDisc*:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in NR relay sidelink discovery messages reception in accordance with 5.8.3.3;

2> if configured by upper layer to transmit NR sidelink non-relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-NonRelayDiscovery*:

3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC\_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-NonRelayDiscovery*; or

3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqListDisc*; or if the information carried by the *sl-TxResourceReqListDisc* has changed since the last transmission of the *SidelinkUEInformationNR* message:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink non-relay discovery messages resources required by the UE in accordance with 5.8.3.3;

2> else:

3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-TxResourceReqListDisc*:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink non-relay discovery messages resources in accordance with 5.8.3.3;

2> if configured by upper layer to transmit NR sidelink L2 U2N relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L2U2N-Relay*; or if configured by upper layer to transmit NR sidelink L3 U2N relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L3U2N-RelayDiscovery*:

3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC\_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-L2U2N-Relay* in case L2 U2N relay operation or connected to a PCell providing *SIB12* but not including *sl-L3U2N-RelayDiscovery* in case of L3 U2N relay operation; or

3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqListDisc*; or if the information carried by the *sl-TxResourceReqListDisc* has changed since the last transmission of the *SidelinkUEInformationNR* message:

4> if the UE is capable of U2N Relay UE, and if *SIB12* includes *sl-RelayUE-ConfigCommon*, and if the U2N Relay UE threshold conditions as specified in 5.8.14.2 are met; or

4> if the UE is selecting a U2N Relay UE / has a selected U2N Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommon*, and if the U2N Remote UE threshold conditions as specified in 5.8.15.2 are met:

5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink relay discovery messages resources required by the UE in accordance with 5.8.3.3;

2> else:

3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-TxResourceReqListDisc*:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink relay discovery messages resources in accordance with 5.8.3.3;

2> if configured by upper layer to transmit NR sidelink L2 U2N relay communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L2U2N-Relay* or if configured by upper layer to transmit NR sidelink L3 U2N relay communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L3U2N-RelayDiscovery*:

3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC\_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-L2U2N-Relay* in case L2 U2N relay operation or connected to a PCell providing *SIB12* but not including *sl-L3U2N-RelayDiscovery* in case of L3 U2N relay operation; or

3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqL2U2N-Relay*; or if the information carried by the *sl-TxResourceReqL2U2N-Relay* has changed since the last transmission of the *SidelinkUEInformationNR* message; or if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqL3U2N-Relay*; or if the information carried by the *sl-TxResourceReqL3U2N-Relay* has changed since the last transmission of the *SidelinkUEInformationNR* message:

4> if the UE is capable of U2N Relay UE, and if *SIB12* includes *sl-RelayUE-ConfigCommon*, and if the U2N Relay UE threshold conditions as specified in 5.8.14.2 are met; or

4> if the UE is selecting a U2N Relay UE / has a selected U2N Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommon*, and if the U2N Remote UE threshold conditions as specified in 5.8.15.2 are met:

5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink relay communication transmission resources required by the UE in accordance with 5.8.3.3;

2> else:

3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-TxResourceReqL2U2N-Relay or sl-TxResourceReqL3U2N-Relay*:

4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink relay communication transmission resources in accordance with 5.8.3.3;

2> if configured by upper layers to perform NR sidelink reception on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell:

3> if the UE received a sidelink DRX configuration for NR sidelink unicast communication from the associated peer UE and the UE accepted the sidelink DRX configuration:

4> initiate transmission of the *SidelinkUEInformationNR* message to report the sidelink DRX configuration in accordance with 5.8.3.3;

3> if the UE is an RX UE for NR sidelink groupcast or broadcast communication and is interested in a service that sidelink DRX is applied:

4> initiate transmission of the *SidelinkUEInformationNR* message to report the Destination Layer-2 ID and QoS profile associated with the service in accordance with 5.8.3.3;

2> if configured by upper layers to perform NR sidelink transmission on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell:

3> if the UE received a sidelink DRX assistance information for NR sidelink unicast communication from the associated peer UE:

4> initiate transmission of the *SidelinkUEInformationNR* message to report the sidelink DRX assistance information in accordance with 5.8.3.3;

#### 5.8.3.3 Actions related to transmission of *SidelinkUEInformationNR* message

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

1> if the UE initiates the procedure to indicate it is (no more) interested to receive NR sidelink communication or to request (configuration/ release) of NR sidelink communication transmission resources or to report to the network that a sidelink radio link failure or sidelink RRC reconfiguration failure has been declared or to report to the network the sidelink DRX configuration for NR sidelink unicast reception or to report to the network the sidelink DRX assistance information or the sidelink DRX configuration reject information for NR sidelink unicast transmission or to report to the network the Destination Layer-2 ID and QoS profile associated with its interested services that sidelink DRX is applied for NR sidelink groupcast or broadcast reception or to indicate it is (no more) interested to receive NR sidelink discovery messages or to request (configuration/ release) of NR sidelink discovery messages transmission resources or to request (configuration/ release) of NR sidelink U2N relay communication transmission resources (i.e. UE includes all concerned information, irrespective of what triggered the procedure):

2> if *SIB12* including *sl-ConfigCommonNR* is provided by the PCell:

3> if configured by upper layers to receive NR sidelink communication:

4> include *sl-RxInterestedFreqList* and set it to the frequency for NR sidelink communication reception;

3> if configured by upper layers to transmit non-relay NR sidelink communication:

4> include *sl-TxResourceReqList* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink communication resource:

5> set *sl-DestinationIdentity* to the destination identity configured by upper layer for NR sidelink communication transmission;

5> set *sl-CastType* to the cast type of the associated destination identity configured by the upper layer for the NR sidelink communication transmission;

5> set *sl-RLC-ModeIndication* to include the RLC mode(s) and optionally QoS profile(s) of the sidelink QoS flow(s) of the associated RLC mode(s), if the associated bi-directional sidelink DRB has been established due to the configurationby *RRCReconfigurationSidelink*;

5> set *sl-QoS-InfoList* to include QoS profile(s) of the sidelink QoS flow(s) of the associated destination configured by the upper layer for the NR sidelink communication transmission;

5> set *sl-InterestedFreqList* to indicate the frequency of the associated destination for NR sidelink communication transmission;

5> set *sl-TypeTxSyncList* to the current synchronization reference type used on the associated *sl-InterestedFreqList* for NR sidelink communication transmission.

5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from the associated peer UE.

4> if a sidelink radio link failure or a sidelink RRC reconfiguration failure has been declared, according to clauses 5.8.9.3 and 5.8.9.1.8, respectively;

5> include *sl-FailureList* and set its fields as follows for each destination for which it reports the NR sidelink communication failure:

6> set *sl-DestinationIdentity* to the destination identity configured by upper layer for NR sidelink communication transmission;

6> if the sidelink RLF is detected as specified in clause 5.8.9.3:

7> set *sl-Failure* as *rlf* for the associated destination for the NR sidelink communication transmission;

6> else if *RRCReconfigurationFailureSidelink* is received:

7> set *sl-Failure* as *configFailure* for the associated destination for the NR sidelink communication transmission;

3> if *SIB12* including *sl-NonRelayDiscovery* and if configured by upper layers to receive NR sidelink non-relay discovery messages, or if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to receive NR sidelink L2 U2N relay discovery messages, or if *SIB12* including *sl-L3U2N-RelayDiscovery* and if configured by upper layers to receive NR sidelink L3 U2N relay discovery messages:

4> include *sl-RxInterestedFreqListDisc* and set it to the frequency for NR sidelink discovery messages reception;

4> if the UE is capable of L2 U2N remote UE:

5> include *sl-SourceIdentityRemoteUE* and set it to the source identity configured by upper layer for NR sidelink L2 U2N relay communication transmission;

3> if *SIB12* including *sl-NonRelayDiscovery* and if configured by upper layers to transmit NR sidelink non-relay discovery messages, or if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to transmit NR sidelink L2 U2N relay discovery messages, or if *SIB12* including *sl-L3U2N-RelayDiscovery* and if configured by upper layers to transmit NR sidelink L3 U2N relay discovery messages:

4> include *sl-TxResourceReqListDisc* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink discovery messages resource:

5> set *sl-DestinationIdentityDisc* to the destination identity configured by upper layer for NR sidelink discoverymessages transmission;

5> if the UE is acting as L2 U2N Relay UE:

6> set *sl-SourceIdentityRelayUE* to the source identity configured by upper layer for NR sidelink L2 U2N relay discovery messages transmission;

5> set *sl-CastTypeDisc* to the cast type of the associated destination identity configured by the upper layer for the NR sidelink discovery messages transmission;

5> set *sl-TxInterestedFreqListDisc* to indicate the frequency of the associated destination for NR sidelink discovery messages transmission;

5> set *sl-TypeTxSyncListDisc* to the current synchronization reference type used on the associated *sl-InterestedFreqList* for NR sidelink discovery messages transmission;

5> set *sl-DiscoveryType* to the current discovery type of the associated destination identity configured by the upper layer for NR sidelink discovery messages transmission;

3> if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to transmit NR sidelink L2 U2N relay communication and the UE is acting as L2 U2N Relay UE:

4> include *sl-TxResourceReqL2U2N-Relay* in *sl-TxResourceReqListCommRelay* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink L2 U2N relay communication resource:

5> set *sl-DestinationIdentityL2U2N* to the destination identity configured by upper layer for NR sidelink L2 U2N relay communication transmission;

5> set *sl-TxInterestedFreqListL2U2N* to indicate the frequency of the associated destination for NR sidelink L2 U2N relay communication transmission;

5> set *sl-TypeTxSyncListL2U2N* to the current synchronization reference type used on the associated *sl-InterestedFreqListL2U2N* for NR sidelink L2 U2N relay communication transmission;

5> set *sl-LocalID-Request* to request local ID for L2 U2N Remote UE;

5> set *sl-PagingIdentityRemoteUE* to the paging UE ID received from peer L2 U2N Remote UE, if it is not released as in 5.8.9.8.3;

5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from peer UE.

4> include *ue-Type* and set it to *relayUE*;

3> if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to transmit NR sidelink L2 U2N relay communication and the UE has a selected L2 U2N Relay UE:

4> include *sl-TxResourceReqL2U2N-Relay* in *sl-TxResourceReqListCommRelay* and set its fields (if needed) as follows to request network to assign NR sidelink L2 U2N relay communication resource:

5> set *sl-TxInterestedFreqListL2U2N* to indicate the frequency of the associated destination for NR sidelink L2 U2N relay communication transmission;

5> set *sl-TypeTxSyncListL2U2N* to the current synchronization reference type used on the associated *sl-InterestedFreqListL2U2N* for NR sidelink L2 U2N relay communication transmission;

5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from peer UE.

4> include *ue-Type* and set it to *remoteUE*;

3> if *SIB12* including *sl-L3U2N-RelayDiscovery* and if configured by upper layers to transmit NR sidelink L3 U2N relay communication:

4> include *sl-TxResourceReqL3U2N-Relay* in *sl-TxResourceReqListCommRelay* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink L3 U2N relay communication resource:

5> set *sl-DestinationIdentity* to the destination identity configured by upper layer for NR sidelink L3 U2N relay communication transmission;

5> set *sl-CastType* to the cast type of the associated destination identity configured by the upper layer for the NR sidelink L3 U2N relay communication transmission;

5> set *sl-RLC-ModeIndication* to include the RLC mode(s) and optionally QoS profile(s) of the sidelink QoS flow(s) of the associated RLC mode(s), if the associated bi-directional sidelink DRB has been established due to the configurationby *RRCReconfigurationSidelink*;

5> set *sl-QoS-InfoList* to include QoS profile(s) of the sidelink QoS flow(s) of the associated destination configured by the upper layer for the NR sidelink L3 U2N relay communication transmission;

5> set *sl-TxInterestedFreqList* to indicate the frequency of the associated destination for NR sidelink L3 U2N relay communication transmission;

5> set *sl-TypeTxSyncList* to the current synchronization reference type used on the associated *sl-InterestedFreqList* for NR sidelink L3 U2N relay communication transmission.

5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from peer UE.

4> include *ue-Type* and set it to *relayUE* if the UE is acting as NR sidelink L3 U2N Relay UE or to *remoteUE* otherwise;

3> if *sl-DRX-ConfigCommon-GC-BC* is included in *SIB12-IEs*:

4> if configured by upper layers to perform NR sidelink reception:

5> include *sl-RxDRX-ReportList* and set its fields (if needed) as follows for each destination for which it reports to network:

6> set *sl-DRX-ConfigFromTx* to include the accepted sidelink DRX configuration of the associated destination for NR sidelink unicast communication, if received from the associated peer UE;

6> set *sl-RxInterestedQoS-InfoList* to include the QoS profile of its interested service for the associated destination for NR sidelink groupcast or broadcast communication;

4> if configured by upper layers to perform NR sidelink reception and configured with *sl-ScheduledConfig*:

5> include *sl-TxResourceReqList* and/or *sl-TxResourceReqListCommRelay-r17* and set its fields (if needed) as follows for each destination for which it reports to network:

6> set *sl-DRX-InfoFromRx* to include the sidelink DRX assistance information of the associated destination, if any, received from the associated peer UE;

Editor's Note: FFS on the message used for Tx UE to report DRX configuration reject information.

1> if the UE initiates the procedure while connected to an E-UTRA PCell:

2> submit the *SidelinkUEInformationNR* to lower layers via SRB1, embedded in E-UTRA RRC message *ULInformationTransferIRAT* as specified in TS 36.331 [10], clause 5.6.28;

1> else:

2> submit the *SidelinkUEInformationNR* message to lower layers for transmission.

### 5.8.4 Void

### 5.8.5 Sidelink synchronisation information transmission for NR sidelink communication/discovery

5.8.5.1 General

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**Figure 5.8.5.1-1: Synchronisation information transmission for NR sidelink communication/discovery, in (partial) coverage**

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**Figure 5.8.5.1-2: Synchronisation information transmission for NR sidelink communication/discovery, out of coverage**

The purpose of this procedure is to provide synchronisation information to a UE. This procedure also applies to NR sidelink discovery.

5.8.5.2 Initiation

A UE capable of NR sidelink communication/discovery and SLSS/PSBCH transmission shall, when transmitting NR sidelink communication/discovery, and if the conditions for NR sidelink communication/discovery operation are met and when the following conditions are met:

1> if in coverage on the frequency used for NR sidelink communication/discovery, as defined in TS 38.304 [20]; and has selected GNSS or the cell as synchronization reference as defined in 5.8.6.3; or

1> if out of coverage on the frequency used for NR sidelink communication/discovery, and the frequency used to transmit NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-FreqInfoList* within *SIB12*; and has selected GNSS or the cell as synchronization reference as defined in 5.8.6.3:

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

2> if *networkControlledSyncTx* is not configured; and for the concerned frequency *syncTxThreshIC* is configured; and the RSRP measurement of the reference cell, selected as defined in 5.8.6.3, for NR sidelink communication/discovery transmission is below the value of *syncTxThreshIC*:

3> transmit sidelink SSB on the frequency used for NR sidelink communication/discovery in accordance with 5.8.5.3 and TS 38.211 [16], including the transmission of SLSS as specified in 5.8.5.3 and transmission of *MasterInformationBlockSidelink* as specified in 5.8.9.4.3;

1> else:

2> for the frequency used for NR sidelink communication/discovery, if *syncTxThreshOoC* is included in *SidelinkPreconfigNR*; and the UE is not directly synchronized to GNSS, and the UE has no selected SyncRef UE or the PSBCH-RSRP measurement result of the selected SyncRef UE is below the value of *syncTxThreshOoC*; or

2> for the frequency used for NR sidelink communication/discovery, if the UE selects GNSS as the synchronization reference source:

3> transmit sidelink SSB on the frequency used for NR sidelink communication/discovery in accordance with TS 38.211 [16] , including the transmission of SLSS as specified in 5.8.5.3 and transmission of *MasterInformationBlockSidelink* as specified in 5.8.9.4.3;

5.8.5.3 Transmission of SLSS

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

1> if triggered by NR sidelink communication/discovery and in coverage on the frequency used for NR sidelink communication/discovery, as defined in TS 38.304 [20]; or

1> if triggered by NR sidelink communication/discovery, and out of coverage on the frequency used for NR sidelink communication/discovery, and the concerned frequency is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-FreqInfoList* within *SIB12*:

2> if the UE has selected GNSS as synchronization reference in accordance with 5.8.6.2:

3> select SLSSID 0;

3> use *sl-SSB-TimeAllocation1* included in the entry of configured *sl-SyncConfigList* corresponding to the concerned frequency, that includes *txParameters* and *gnss-Sync*;

3> select the slot(s) indicated by *sl-SSB-TimeAllocation1*;

2> if the UE has selected a cell as synchronization reference in accordance with 5.8.6.2:

3> select the SLSSID included in the entry of configured *sl-SyncConfigList* corresponding to the concerned frequency, that includes *txParameters* and does not include *gnss-Sync*;

3> select the slot(s) indicated by *sl-SSB-TimeAllocation1*;

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

2> select SLSSID 0;

2> if *sl-SSB-TimeAllocation3* is configured for the frequency used in *SidelinkPreconfigNR:*

3> select the slot(s) indicated by *sl-SSB-TimeAllocation3*;

2> else:

3> select the slot(s) indicated by *sl-SSB-TimeAllocation1*;

1> else:

2> select the synchronisation reference UE (i.e. SyncRef UE) as defined in 5.8.6;

2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlockSidelink* message received from this UE is set to *true*; or

2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlockSidelink* message received from this UE is set to *false* while the SLSS from this UE is part of the set defined for out of coverage, see TS 38.211 [16]:

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

3> select the slot in which to transmit the SLSS according to the *sl-SSB-TimeAllocation1* or *sl-SSB-TimeAllocation2* included in the preconfigured sidelink parameters corresponding to the concerned frequency, such that the timing is different from the SLSS of the selected SyncRef UE;

2> else if the UE has a selected SyncRef UE and the SLSS from this UE was transmitted on the slot(s) indicated *sl-SSB-TimeAllocation3*, whichis configured for the frequency used in *SidelinkPreconfigNR*:

3> select SLSSID 337;

3> select the slot(s) indicated by *sl-SSB-TimeAllocation2*;

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

3> select the SLSSID from the set defined for out of coverage having an index that is 336 more than the index of the SLSSID of the selected SyncRef UE, see TS 38.211 [16];

3> select the slot in which to transmit the SLSS according to *sl-SSB-TimeAllocation1* or *sl-SSB-TimeAllocation2* included in the preconfigured sidelink parameters corresponding to the concerned frequency, such that the timing is different from the SLSS of the selected SyncRef UE;

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

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

4> randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage except SLSSID 336 and 337, see TS 38.211 [16];

4> select the slot in which to transmit the SLSS according to the *sl-SSB-TimeAllocation1* or *sl-SSB-TimeAllocation2* (arbitrary selection between these) included in the preconfigured sidelink parameters in *SidelinkPreconfigNR* corresponding to the concerned frequency;

### 5.8.5a Sidelink synchronisation information transmission for V2X sidelink communication

#### 5.8.5a.1 General



Figure 5.8.5a.1-1: Synchronisation information transmission for V2X sidelink communication, in (partial) coverage



Figure 5.8.5a.1-2: Synchronisation information transmission for V2X sidelink communication, out of coverage

The purpose of this procedure is to provide synchronisation information to a UE.

#### 5.8.5a.2 Initiation

A UE capable of V2X sidelink communication initiates the transmission of SLSS and *MasterInformationBlock-SL-V2X* according to the conditions and the procedures specified for V2X sidelink communication in clause 5.10.7 of TS 36.331 [10].

NOTE 1: When applying the procedure in this clause, *SIB13* and *SIB14* correspond to *SystemInformationBlockType21* and *SystemInformationBlockType26* specified in TS 36.331 [10] respectively

### 5.8.6 Sidelink synchronisation reference

5.8.6.1 General

The purpose of this procedure is to select a synchronisation reference and used when transmitting NR sidelink communication/discovery. This procedure also applies to NR sidelink discovery.

5.8.6.2 Selection and reselection of synchronisation reference

The UE shall:

1> if the frequency used for NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-ConfigCommonNR* within *SIB12*, and *sl-SyncPriority* is configured for the concerned frequency and set to *gnbEnb*:

2> select a cell as the synchronization reference source as defined in 5.8.6.3:

1> else if the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-ConfigCommonNR* within *SIB12*, and *sl-SyncPriority* for the concerned frequency is not configured or is set to *gnss*, and GNSS is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]:

2> select GNSS as the synchronization reference source;

1> else if the frequency used for NR sidelink communication/discovery is included in *SL-PreconfigurationNR*, and *sl-SyncPriority* in *SidelinkPreconfigNR* is set to *gnss* and GNSS is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]:

2> select GNSS as the synchronization reference source;

1> else:

2> perform a full search (i.e. covering all subframes and all possible SLSSIDs) to detect candidate SLSS, in accordance with TS 38.133 [14]

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

2> if the UE has selected a SyncRef UE:

3> if the PSBCH-RSRP of the strongest candidate SyncRef UE exceeds the minimum requirement TS 38.133 [14] by *sl-SyncRefMinHyst* and the strongest candidate SyncRef UE belongs to the same priority group as the current SyncRef UE and the PSBCH-RSRP of the strongest candidate SyncRef UE exceeds the PSBCH-RSRP of the current SyncRef UE by *syncRefDiffHyst*; or

3> if the PSBCH-RSRP of the candidate SyncRef UE exceeds the minimum requirement TS 38.133 [14] by *sl-SyncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than the current SyncRef UE; or

3> if GNSS becomes reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14], and GNSS belongs to a higher priority group than the current SyncRef UE; or

3> if a cell is detected and gNB/eNB (if *sl-NbAsSync* is set to *true*) belongs to a higher priority group than the current SyncRef UE; or

3> if the PSBCH-RSRP of the current SyncRef UE is less than the minimum requirement defined in TS 38.133 [14]:

4> consider no SyncRef UE to be selected;

2> if the UE has selected GNSS as the synchronization reference for NR sidelink communication/discovery:

3> if the PSBCH-RSRP of the candidate SyncRef UE exceeds the minimum requirement defined in TS 38.133 [14] by *sl-SyncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than GNSS; or

3> if GNSS becomes not reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]:

4> consider GNSS not to be selected;

2> if the UE has selected cell as the synchronization reference for NR sidelink communication/discovery:

3> if the PSBCH-RSRP of the candidate SyncRef UE exceeds the minimum requirement defined in TS 38.133 [14] by *sl-SyncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than gNB/eNB; or

3> if the selected cell is not detected:

4> consider the cell not to be selected;

2> if the UE has not selected any synchronization reference:

3> if the UE detects one or more SLSSIDs for which the PSBCH-RSRP exceeds the minimum requirement defined in TS 38.133 [14] by *sl-SyncRefMinHyst* and for which the UE received the corresponding *MasterInformationBlockSidelink* message (candidate SyncRef UEs), or if the UE detects GNSS that is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14], or if the UE detects a cell, select a synchronization reference according to the following priority group order:

4> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnbEnb*:

5> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, starting with the UE with the highest PSBCH-RSRP result (priority group 1);

5> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 2);

5> GNSS that is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14] (priority group 3);

5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true,* or of which SLSSID is 0 and SLSS is transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, starting with the UE with the highest PSBCH-RSRP result (priority group 4);

5> UEs of which SLSSID is 0 and SLSS is not transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 5);

5> UEs of which SLSSID is 337 and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 5);

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

4> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnss*, and *sl-NbAsSync* is set to *true:*

5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*,or of which SLSSID is 0 and SLSS is transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, starting with the UE with the highest PSBCH-RSRP result (priority group 1);

5> UEs of which SLSSID is 0 and SLSS is not transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCHS-RSRP result (priority group 2);

5> UEs of which SLSSID is 337 and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 2);

5> the cell detected by the UE as defined in 5.8.6.3 (priority group 3);

5> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, starting with the UE with the highest PSBCH-RSRP result (priority group 4);

5> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 5);

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

4> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnss*, and *sl-NbAsSync* is set to *false:*

5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, or of which SLSSID is 0 and SLSS is transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, starting with the UE with the highest PSBCH-RSRP result (priority group 1);

5> UEs of which SLSSID is 0 and SLSS is not transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCHS-RSRP result (priority group 2);

5> UEs of which SLSSID is 337 and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 2);

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

NOTE: How the UE achieves subframe boundary alignment between V2X sidelink communication and NR sidelink communication/discovery (if both are performed by the UE) is as specified in TS 38.213, clause 16.7.

5.8.6.3 Sidelink communication transmission reference cell selection

A UE capable of NR sidelink communication/discovery that is configured by upper layers to transmit NR sidelink communication/discovery shall:

1> for the frequency used to transmit NR sidelink communication/discovery, select a cell to be used as reference for synchronization in accordance with the following:

2> if the frequency concerns the primary frequency:

3> use the PCell or the serving cell as reference;

2> else if the frequency concerns a secondary frequency:

3> use the concerned SCell as reference;

2> else if the UE is in coverage of the concerned frequency:

3> use the DL frequency paired with the one used to transmit NR sidelink communication/discovery as reference;

2> else (i.e., out of coverage on the concerned frequency):

3> use the PCell or the serving cell as reference, if needed;

### 5.8.7 Sidelink communication reception

A UE capable of NR sidelink communication that is configured by upper layers to receive NR sidelink communication shall:

1> if the conditions for NR sidelink communication operation as defined in 5.8.2 are met:

2> if the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* message or *sl-FreqInfoList* included in *SIB12*:

3> if the UE is configured with *sl-RxPool* included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):

4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by *sl-RxPool*;

3> else if the cell chosen for NR sidelink communication provides *SIB12*:

4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by *sl-RxPool in SIB12*;

2> else:

3> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources that were preconfigured by *sl-RxPool* in *SL-PreconfigurationNR*, asdefined in clause 9.3;

### 5.8.8 Sidelink communication transmission

A UE capable of NR sidelink communication that is configured by upper layers to transmit NR sidelink communication and has related data to be transmitted shall:

1> if the conditions for NR sidelink communication operation as defined in 5.8.2 are met:

2> if the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-ConfigCommonNR* within *SIB12*:

3> if the UE is in RRC\_CONNECTED and uses the frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message:

4> if the UE is configured with *sl-ScheduledConfig*:

5> if T310 for MCG or T311 is running; and if *sl-TxPoolExceptional* is included in *sl-FreqInfoList* for the concerned frequency in *SIB12* or included in *sl-ConfigDedicatedNR* in *RRCReconfiguration*; or

5> if T301 is running and the cell on which the UE initiated RRC connection re-establishment provides *SIB12* including *sl-TxPoolExceptional* for the concerned frequency; or

5> if T304 for MCG is running and the UE is configured with *sl-TxPoolExceptional* included in *sl-ConfigDedicatedNR* for the concerned frequency in *RRCReconfiguration*:

6> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the pool of resources indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];

5> else:

6> configure lower layers to perform the sidelink resource allocation mode 1 for NR sidelink communication;

5> if T311 is running, configure the lower layers to release the resources indicated by *rrc-ConfiguredSidelinkGrant* (if any);

4> if the UE is configured with *sl-UE-SelectedConfig*:

5> if a result of sensing on the resources configured in *sl-TxPoolSelectedNormal* for the concerned frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* is not available in accordance with TS 38.214 [19];

6> if *sl-TxPoolExceptional* for the concerned frequency is included in *RRCReconfiguration*; or

6> if the PCell provides *SIB12* including *sl-TxPoolExceptional* in *sl-FreqInfoList* for the concerned frequency:

7> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the pool of resources indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];

5> else, if the *sl-TxPoolSelectedNormal* for the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

6> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-TxPoolSelectedNormal* for the concerned frequency;

3> else:

4> if the cell chosen for NR sidelink communication transmission provides *SIB12*:

5> if *SIB12* includes *sl-TxPoolSelectedNormal* for the concerned frequency,and a result of sensing on the resources configured in the *sl-TxPoolSelectedNormal* is available in accordance with TS 38.214 [19]:

6> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* using the pools of resources indicated by *sl-TxPoolSe lectedNormal* for the concerned frequency as defined in TS 38.321 [3];

5> else if *SIB12* includes *sl-TxPoolExceptional* for the concerned frequency:

6> from the moment the UE initiates RRC connection establishment or RRC connection resume, until receiving an *RRCReconfiguration* including *sl-ConfigDedicatedNR*, or receiving an *RRCRelease* or an *RRCReject*; or

6> if a result of sensing on the resources configured in *sl-TxPoolSelectedNormal* for the concerned frequency in *SIB12* is not available in accordance with TS 38.214 [19]:

7> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection (as defined in TS 38.321 [3]) using one of the pools of resources indicated by *sl-TxPoolExceptional* for the concerned frequency;

2> else:

3> configure lower layers to perform the sidelink resource allocation mode 2 based on sensing (as defined in TS 38.321 [3] and TS 38.213 [13]) using the pools of resources indicated by *sl-TxPoolSelectedNormal* in *SidelinkPreconfigNR* for the concerned frequency.

NOTE 1: The UE continues to use resources configured in *rrc-ConfiguredSidelinkGrant* (while T310 is running) until it is released (i.e. until T310 has expired). The UE does not use sidelink configured grant type 2 resources while T310 is running.

NOTE 2: In case of RRC reconfiguration with sync, the UE uses resources configured in *rrc-ConfiguredSidelinkGrant* (while T304 on the MCG is running) if provided by the target cell.

NOTE 3: It is up to UE implementation to determine, in accordance with TS 38.321[3], which resource pool to use if multiple resource pools are configured, and which resource allocation scheme is used in the AS based on UE capability (for a UE in RRC\_IDLE/RRC\_INACTIVE) and the allowed resource schemes *sl-allowedResourceSelectionConfig* in the resource pool configuration.

If configured to perform sidelink resource allocation mode 2, the UE capable of NR sidelink communication that is configured by upper layers to transmit NR sidelink communication shall perform resource selection operation according to *sl-AllowedResourceSelectionConfig* on all pools of resources which may be used for transmission of the sidelink control information and the corresponding data. The pools of resources are indicated by *SidelinkPreconfigNR*, *sl-TxPoolSelectedNormal* in *sl-ConfigDedicatedNR*, or *sl-TxPoolSelectedNormal* in *SIB12* for the concerned frequency, as configured above.

### 5.8.9 Sidelink RRC procedure

#### 5.8.9.1 Sidelink RRC reconfiguration

##### 5.8.9.1.1 General



Figure 5.8.9.1.1-1: Sidelink RRC reconfiguration, successful



Figure 5.8.9.1.1-2: Sidelink RRC reconfiguration, failure

The purpose of this procedure is to modify a PC5-RRC connection, e.g. to establish/modify/release sidelink DRBs or PC5 Relay RLC channels, to (re-)configure NR sidelink measurement and reporting, to (re-)configure sidelink CSI reference signal resources, to (re)configure CSI reporting latency bound, to (re)configure sidelink DRX, and to (re-)configure the latency bound of SL Inter-UE coordination report.

The UE may initiate the sidelink RRC reconfiguration procedure and perform the operation in clause 5.8.9.1.2 on the corresponding PC5-RRC connection in following cases:

- the release of sidelink DRBs associated with the peer UE, as specified in clause 5.8.9.1a.1;

- the establishment of sidelink DRBs associated with the peer UE, as specified in clause 5.8.9.1a.2;

- the modification for the parameters included in *SLRB-Config* of sidelink DRBs associated with the peer UE, as specified in clause 5.8.9.1a.2;

- the release of PC5 Relay RLC channels for L2 U2N Relay UE and Remote UE, as specified in clause 5.8.9.7.1;

- the establishment of PC5 Relay RLC channels for L2 U2N Relay UE and Remote UE, as specified in clause 5.8.9.7.2;

- the modification for the parameters included in *SL-RLC-ChannelConfigPC5* of PC5 Relay RLC channels for L2 U2N Relay UE and Remote UE, as specified in clause 5.8.9.7.2;

- the (re-)configuration of the peer UE to perform NR sidelink measurement and report.

- the (re-)configuration of the sidelink CSI reference signal resources and CSI reporting latency bound;

- the (re-)configuration of the peer UE to perform sidelink DRX;

- the (re-)configuration of the latency bound of SL Inter-UE coordination report.

In RRC\_CONNECTED, the UE applies the NR sidelink communications parameters provided in *RRCReconfiguration* (if any). In RRC\_IDLE or RRC\_INACTIVE, the UE applies the NR sidelink communications parameters provided in system information (if any). For other cases, UEs apply the NR sidelink communications parameters provided in *SidelinkPreconfigNR* (if any). When UE performs state transition between above three cases, the UE applies the NR sidelink communications parameters provided in the new state, after acquisition of the new configurations. Before acquisition of the new configurations, UE continues applying the NR sidelink communications parameters provided in the old state.

##### 5.8.9.1.2 Actions related to transmission of *RRCReconfigurationSidelink* message

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

1> for each sidelink DRB that is to be released, according to clause 5.8.9.1a.1.1, due to configuration by *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR* or by upper layers:

2> set the *SLRB-PC5-ConfigIndex* included in the *slrb-ConfigToReleaseList* corresponding to the sidelink DRB;

1> for each sidelink DRB that is to be established or modified, according to clause 5.8.9.1a.2.1, due to receiving *sl-ConfigDedicatedNR,* *SIB12* or *SidelinkPreconfigNR*:

2> set the *SLRB-Config* included in the *slrb-ConfigToAddModList*, according to the received *sl-RadioBearerConfig* and *sl-RLC-BearerConfig* corresponding to the sidelink DRB;

1> set the *sl-MeasConfig* as follows:

2> If the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within SIB12:

3> if UE is in RRC\_CONNECTED:

4> set the *sl-MeasConfig* according to stored NR sidelink measurement configuration information for this destination;

3> if UE is in RRC\_IDLE or RRC\_INACTIVE:

4> set the *sl-MeasConfig* according to stored NR sidelink measurement configuration received from *SIB12*;

2> else:

3> set the *sl-MeasConfig* according to the *sl-MeasPreconfig* in *SidelinkPreconfigNR*;

1> set the *sl-LatencyBoundIUC-Report;*

1> start timer T400 for the destination;

1> set the *sl-CSI-RS-Config*;

1> set the *sl-LatencyBoundCSI-Report*,

NOTE 1: How to set the parameters included in *sl-CSI-RS-Config* and *sl-LatencyBoundCSI-Report* is up to UE implementation.

1> set the *sl-DRX-ConfigUC-PC5* as follows:

2> If the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*:

3> if UE is in RRC\_CONNECTED and if *sl-ScheduledConfig* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

4> set the *sl-DRX-ConfigUC-PC5* according to stored NR sidelink DRX configuration information for this destination.

NOTE 2: If UE is in RRC\_IDLE or in RRC\_INACTIVE or out of coverage, or in RRC\_CONNECTED and *sl-UE-SelectedConfig* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*, it is up to UE implementation to set the *sl-DRX-ConfigUC-PC5*.

1> for each PC5 Relay RLC channel that is to be released due to configuration by *sl-ConfigDedicatedNR*:

2> set the *SL-RLC-ChannelID* corresponding to the PC5 Relay RLC channel in the *sl-RLC-ChannelToReleaseListPC5*;

1> for each PC5 Relay RLC channel that is to be established or modified due to receiving *sl-ConfigDedicatedNR*:

2> set the *SL-RLC-ChannelConfigPC5* included in the *sl-RLC-ChannelToAddModListPC5*, according to the received *sl-RLC-ChannelConfig* corresponding to the PC5 Relay RLC channel;

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

##### 5.8.9.1.3 Reception of an *RRCReconfigurationSidelink* by the UE

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

1> if the *RRCReconfigurationSidelink* includes the *sl-ResetConfig*:

2> perform the sidelink reset configuration procedure as specified in 5.8.9.1.10;

1> if the *RRCReconfigurationSidelink* includes the *slrb-ConfigToReleaseList*:

2> for each *SLRB-PC5-ConfigIndex* value included in the *slrb-ConfigToReleaseList* that is part of the current UE sidelink configuration;

3> perform the sidelink DRB release procedure, according to clause 5.8.9.1a.1;

1> if the *RRCReconfigurationSidelink* includes the *slrb-ConfigToAddModList*:

2> for each *slrb-PC5-ConfigIndex* value included in the *slrb-ConfigToAddModList* that is not part of the current UE sidelink configuration:

3> if *sl-MappedQoS-FlowsToAddList* is included:

4> apply the *SL-PQFI* included in *sl-MappedQoS-FlowsToAddList*;

3> perform the sidelink DRB addition procedure, according to clause 5.8.9.1a.2;

2> for each *slrb-PC5-ConfigIndex* value included in the *slrb-ConfigToAddModList* that is part of the current UE sidelink configuration:

3> if *sl-MappedQoS-FlowsToAddList* is included:

4> add the *SL-PQFI* included in *sl-MappedQoS-FlowsToAddList* to the corresponding sidelink DRB;

3> if *sl-MappedQoS-FlowsToReleaseList* is included:

4> remove the *SL-PQFI* included in *sl-MappedQoS-FlowsToReleaseList* from the corresponding sidelink DRB;

3> if the sidelink DRB release conditions as described in clause 5.8.9.1a.1.1 are met:

4> perform the sidelink DRB release procedure according to clause 5.8.9.1a.1.2;

3> else if the sidelink DRB modification conditions as described in clause 5.8.9.1a.2.1 are met:

4> perform the sidelink DRB modification procedure according to clause 5.8.9.1a.2.2;

1> if the *RRCReconfigurationSidelink* message includes the *sl-MeasConfig*:

2> perform the sidelink measurement configuration procedure as specified in 5.8.10;

1> if the *RRCReconfigurationSidelink* message includes the *sl-CSI-RS-Config*:

2> apply the sidelink CSI-RS configuration;

1> if the *RRCReconfigurationSidelink* message includes the *sl-LatencyBoundCSI-Report*:

2> apply the configured sidelink CSI report latency bound;

1> if the *RRCReconfigurationSidelink* includes the *sl-RLC-ChannelToReleaseListPC5*:

2> for each *SL-RLC-ChannelID* value included in the *sl-RLC-ChannelToReleaseListPC5* that is part of the current UE sidelink configuration;

3> perform the PC5 Relay RLC channel release procedure, according to clause 5.8.9.7.1;

1> if the *RRCReconfigurationSidelink* includes the *sl-RLC-ChannelToAddModListPC5*:

2> for each *sl-RLC-ChannelID-PC5* value included in the *sl-RLC-ChannelToAddModListPC5* that is not part of the current UE sidelink configuration:

3> perform the PC5 RLC channel addition procedure, according to clause 5.8.9.7.2;

2> for each *sl-RLC-ChannelID-PC5* value included in the *sl-RLC-ChannelToAddModListPC5* that is part of the current UE sidelink configuration:

3> perform the PC5 Relay RLC channel modification procedure according to clause 5.8.9.7.2;

1> if the *RRCReconfigurationSidelink* message includes the *sl-DRX-ConfigUC-PC5*, and

1> if the UE accepts the *sl-DRX-ConfigUC-PC5*:

2> configure lower layers to perform sidelink DRX operation according to *sl-DRX-ConfigUC-PC5* for the associated destination as defined in TS 38.321 [3];

1> if the *RRCReconfigurationSidelink* message includes the *sl-LatencyBoundIUC-Report*:

2> apply the configured sidelink IUC report latency bound;

1> if the UE is unable to comply with (part of) the configuration included in the *RRCReconfigurationSidelink* (i.e. sidelink RRC reconfiguration failure):

2> continue using the configuration used prior to the reception of the *RRCReconfigurationSidelink* message;

2> set the content of the *RRCReconfigurationFailureSidelink* message;

3> submit the *RRCReconfigurationFailureSidelink* message to lower layers for transmission;

1> else:

2> set the content of the *RRCReconfigurationCompleteSidelink* message;

3> if the UE rejects the sidelink DRX configuration *sl-DRX-ConfigUC-PC5* received from the peer UE:

4> include the *sl-DRX-ConfigReject* in the *RRCReconfigurationCompleteSidelink* message;

3> submit the *RRCReconfigurationCompleteSidelink* message to lower layers for transmission;

NOTE 1: When the same logical channel is configured with different RLC mode by another UE, the UE handles the case as sidelink RRC reconfiguration failure.

NOTE 2: It is up to the UE whether or not to indicate the rejection to the peer UE for a received sidelink DRX configuration.

##### 5.8.9.1.4 Void

##### 5.8.9.1.5 Void

##### 5.8.9.1.6 Void

##### 5.8.9.1.7 Void

##### 5.8.9.1.8 Reception of an *RRCReconfigurationFailureSidelink* by the UE

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

1> stop timer T400 for the destination, if running;

1> continue using the configuration used prior to corresponding *RRCReconfigurationSidelink* message;

1> if UE is in RRC\_CONNECTED:

2> perform the sidelink UE information for NR sidelink communication procedure, as specified in 5.8.3.3 or clause 5.10.15 in TS 36.331 [10];

##### 5.8.9.1.9 Reception of an *RRCReconfigurationCompleteSidelink* by the UE

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

1> stop timer T400 for the destination, if running;

1> consider the configurations in the corresponding *RRCReconfigurationSidelink* message to be applied.

2> if the *RRCReconfigurationCompleteSidelink* message includes the *sl-DRX-ConfigReject:*

3> consider no sidelink DRX to be applied for the corresponding sidelink unicast communication.

5.8.9.1.10 Sidelink reset configuration

The UE shall:

1> release/clear current sidelink radio configuration of this destination received in the *RRCReconfigurationSidelink*;

1> release the sidelink DRBs of this destination, in according to clause 5.8.9.1a.1;

1> reset the sidelink specific MAC of this destination.

NOTE 1: Sidelink radio configuration is not just the resource configuration but may include other configurations included in the *RRCReconfigurationSidelink* message except the sidelink DRBs of this destination.

NOTE 2: After the sidelink DRB release procedure, UE may perform the sidelink DRB addition according to the current sidelink configuration of this destination, received in *sl-ConfigDedicatedNR,* *SIB12* and *SidelinkPreconfigNR*, according to clause 5.8.9.1a.2.

#### 5.8.9.1a Sidelink radio bearer management

##### 5.8.9.1a.1 Sidelink DRB release

5.8.9.1a.1.1 Sidelink DRB release conditions

For NR sidelink communication, a sidelink DRB release is initiated in the following cases:

1> for groupcast, broadcast and unicast, if *slrb-Uu-ConfigIndex* (if any) of the sidelink DRB isincluded in *sl-RadioBearerToReleaseList* in *sl-ConfigDedicatedNR*; or

1> for groupcast and broadcast, if no sidelink QoS flow with data indicated by upper layers is mapped to the sidelink DRB for transmission, which is (re)configured by receiving *SIB1*2 or *SidelinkPreconfigNR*; or

1> for groupcast, broadcast and unicast, if *SL-RLC-BearerConfigIndex* (if any) of the sidelink DRB is included in *sl-RLC-BearerToReleaseList* in *sl-ConfigDedicatedNR*; or

1> for unicast, if no sidelink QoS flow with data indicated by upper layers is mapped to the sidelink DRB for transmission, which is (re)configured by receiving *SIB12* or *SidelinkPreconfigNR*, and if no sidelink QoS flow mapped to the sidelink DRB, which is (re)configured by receiving *RRCReconfigurationSidelink*, has data; or

1> for unicast, if *SLRB-PC5-ConfigIndex* (if any) of the sidelink DRB isincluded in *slrb-ConfigToReleaseList* in *RRCReconfigurationSidelink* or if *sl-ResetConfig* is included in *RRCReconfigurationSidelink*; or

1> for unicast, when the corresponding PC5-RRC connection is released due to sidelink RLF being detected, according to clause 5.8.9.3; or

1> for unicast, when the corresponding PC5-RRC connection is released due to upper layer request according to clause 5.8.9.5.

5.8.9.1a.1.2 Sidelink DRB release operations

For each sidelink DRB, whose sidelink DRB release conditions are met as in clause 5.8.9.1a.1.1, the UE capable of NR sidelink communication that is configured by upper layers to perform NR sidelink communication shall:

1> for groupcast and broadcast; or

1> for unicast, if the sidelink DRB release was triggered after the reception of the *RRCReconfigurationSidelink* message; or

1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB release was triggered due to the configuration received within the *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:

2> release the PDCP entity for NR sidelink communication associated with the sidelink DRB;

2> if SDAP entity for NR sidelink communication associated with this sidelink DRB is configured:

3> indicate the release of the sidelink DRB to the SDAP entity associated with this sidelink DRB (TS 37.324 [24], clause 5.3.3);

2> release SDAP entities for NR sidelink communication, if any, that have no associated sidelink DRB as specified in TS 37.324 [24] clause 5.1.2;

1> for groupcast and broadcast; or

1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*:

2> for each *sl-RLC-BearerConfigIndex* included in the received *sl-RLC-BearerToReleaseList* that is part of the current UE sidelink configuration:

3> release the RLC entity and the corresponding logical channel for NR sidelink communication, associated with the *sl-RLC-BearerConfigIndex*.

1> for unicast, if the sidelink DRB release was triggered due to the reception of the *RRCReconfigurationSidelink* message; or

1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB release was triggered due to the configuration received within the *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:

2> release the RLC entity and the corresponding logical channel for NR sidelink communication associated with the sidelink DRB;

2> perform the sidelink UE information procedure in clause 5.8.3 for unicast if needed.

1> if the sidelink radio link failure is detected for a specific destination:

2> release the PDCP entity, RLC entity and the logical channel of the sidelink DRB for the specific destination.

##### 5.8.9.1a.2 Sidelink DRB addition/modification

5.8.9.1a.2.1 Sidelink DRB addition/modification conditions

For NR sidelink communication, a sidelink DRB addition is initiated only in the following cases:

1> if any sidelink QoS flow is (re)configured by *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* and is to be mapped to one sidelink DRB*,* which is not established; or

1> if any sidelink QoS flow is (re)configured by *RRCReconfigurationSidelink* and isto be mapped to a sidelink DRB, which is not established;

For NR sidelink communication, a sidelink DRB modification is initiated only in the following cases:

1> if any of the sidelink DRB related parameters is changed by *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or *RRCReconfigurationSidelink* for one sidelink DRB*,* which is established;

5.8.9.1a.2.2 Sidelink DRB addition/modification operations

For the sidelink DRB, whose sidelink DRB addition conditions are met as in clause 5.8.9.1a.2.1, the UE capable of NR sidelink communication that is configured by upper layers to perform NR sidelink communication shall:

1> for groupcast and broadcast; or

1> for unicast, if the sidelink DRB addition was triggered due to the reception of the *RRCReconfigurationSidelink* message; or

1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB addition was triggered due to the configuration received within the *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:

2> if an SDAP entity for NR sidelink communication associated with the destination and the cast type of the sidelink DRB does not exist:

3> establish an SDAP entity for NR sidelink communication as specified in TS 37.324 [24] clause 5.1.1;

2> (re)configure the SDAP entity in accordance with the *sl-SDAP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-SDAP-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, associated with the sidelink DRB;

2> establish a PDCP entity for NR sidelink communication and configure it in accordance with the *sl-PDCP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-PDCP-Config* received in *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR*, associated with the sidelink DRB;

2> establish a RLC entity for NR sidelink communication and configure it in accordance with the *sl-RLC-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-RLC-Config* received in *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR*, associated with sidelink DRB;

2> if this procedure was due to the reception of a *RRCReconfigurationSidelink* message:

3> configure the MAC entity with a logical channel in accordance with the *sl-MAC-LogicalChannelConfigPC5* received in the *RRCReconfigurationSidelink* associated with the sidelink DRB, and perform the sidelink UE information procedure in clause 5.8.3 for unicast if need;

2> else:

3> configure the MAC entity with a logical channel associated with the sidelink DRB, by assigning a new logical channel identity, in accordance with the *sl-MAC-LogicalChannelConfig* received in the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*.

NOTE 1: When a sidelink DRB addition is due to the configurationby *RRCReconfigurationSidelink*, it is up to UE implementation to select the sidelink DRB configuration as necessary transmitting parameters for the sidelink DRB, from the received *sl-ConfigDedicatedNR* (if in RRC\_CONNECTED), *SIB12* (if in RRC\_IDLE/INACTIVE), *SidelinkPreconfigNR* (if out of coverage) with the same RLC mode as the one configured in *RRCReconfigurationSidelink*.

For the sidelink DRB, whose sidelink DRB modification conditions are met as in clause 5.8.9.1a.2.1, the UE capable of NR sidelink communication that is configured by upper layers to perform NR sidelink communication shall:

1> for groupcast and broadcast; or

1> for unicast, if the sidelink DRB modification was triggered due to the reception of the *RRCReconfigurationSidelink* message; or

1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB modification was triggered due to the configuration received within the *sl-ConfigDedicatedNR,* *SIB12* or *SidelinkPreconfigNR*:

2> reconfigure the SDAP entity of the sidelink DRB, in accordance with the *sl-SDAP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-SDAP-Config* received in *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR*, if included;

2> reconfigure the PDCP entity of the sidelink DRB, in accordance with the *sl-PDCP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-PDCP-Config* received in *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR*, if included;

2> reconfigure the RLC entity of the sidelink DRB, in accordance with the *sl-RLC-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-RLC-Config* received in *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR*, if included;

2> reconfigure the logical channel of the sidelink DRB, in accordance with the *sl-MAC-LogicalChannelConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-MAC-LogicalChannelConfig* received in *sl-ConfigDedicatedNR,* *SIB12*, *SidelinkPreconfigNR*, if included.

##### 5.8.9.1a.3 Sidelink SRB release

The UE shall:

1> if a PC5-RRC connection release for a specific destination is requested by upper layers or AS layer; or

1> if the sidelink radio link failure is detected for a specific destination:

2> release the PDCP entity, RLC entity and the logical channel of the sidelink SRB for PC5-RRC message of the specific destination;

2> consider the PC5-RRC connection is released for the destination.

1> if PC5-S transmission for a specific destination is terminated in upper layers:

2> release the PDCP entity, RLC entity and the logical channel of the sidelink SRB(s) for PC5-S message of the specific destination;

1> if discovery transmission for a specific destination is terminated in upper layers:

2> release the PDCP entity, RLC entity and the logical channel of the sidelink SRB4 for discovery message of the specific destination;

##### 5.8.9.1a.4 Sidelink SRB addition

The UE shall:

1> if transmission of PC5-S message for a specific destination is requested by upper layers for sidelink SRB:

2> establish PDCP entity, RLC entity and the logical channel of a sidelink SRB for PC5-S message, as specified in clause 9.1.1.4;

1> if transmission of discovery message for a specific destination is requested by upper layers for sidelink SRB:

2> establish PDCP entity, RLC entity and the logical channel of a sidelink SRB4 for discovery message, as specified in clause 9.1.1.4;

1> if a PC5-RRC connection establishment for a specific destination is indicated by upper layers:

2> establish PDCP entity, RLC entity and the logical channel of a sidelink SRB for PC5-RRC message of the specific destination, as specified in clause 9.1.1.4;

2> consider the PC5-RRC connection is established for the destination.

#### 5.8.9.2 Sidelink UE capability transfer

#### 5.8.9.2.1 General

This clause describes how the UE compiles and transfers its sidelink UE capability information for unicast to the initiating UE.



Figure 5.8.9.2.1-1: Sidelink UE capability transfer

#### 5.8.9.2.2 Initiation

The UE may initiate the sidelink UE capability transfer procedure upon indication from upper layer when it needs (additional) UE radio access capability information.

#### 5.8.9.2.3 Actions related to transmission of the *UECapabilityEnquirySidelink* by the UE

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

1> include in UE radio access capabilities for sidelink within *ue-CapabilityInformationSidelink*, if needed;

NOTE 1: It is up to initiating UE to decide whether *ue-CapabilityInformationSidelink* should be included.

1> set *frequencyBandListFilterSidelink* to include frequency bands for which the peer UE is requested to provide supported bands and band combinations;

NOTE 2: The initiating UE is not allowed to send the *UECapabilityEnquirySidelink* message without including the field *frequencyBandListFilterSidelink.*

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

#### 5.8.9.2.4 Actions related to reception of the *UECapabilityEnquirySidelink* by the UE

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

1> include UE radio access capabilities for sidelink within *ue-CapabilityInformationSidelink*;

1> compile a list of "candidate band combinations" only consisting of bands included in *frequencyBandListFilterSidelink*, and prioritized in the order of *frequencyBandListFilterSidelink* (i.e. first include band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on).

1> include into *supportedBandCombinationListSidelinkNR* as many band combinations as possible from the list of "candidate band combinations", starting from the first entry;

1> include the received *frequencyBandListFilterSidelink* in the field *appliedFreqBandListFilter* of the requested UE capability;

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

NOTE: If the UE cannot include all band combinations due to message size or list size constraints, it is up to UE implementation which band combinations it prioritizes.

#### 5.8.9.3 Sidelink radio link failure related actions

The UE shall:

1> upon indication from sidelink RLC entity that the maximum number of retransmissions for a specific destination has been reached; or

1> upon T400 expiry for a specific destination; or

1> upon indication from MAC entity that the maximum number of consecutive HARQ DTX for a specific destination has been reached; or

1> upon integrity check failure indication from sidelink PDCP entity concerning SL-SRB2 or SL-SRB3 for a specific destination:

2> consider sidelink radio link failure to be detected for this destination;

2> release the DRBs of this destination, according to clause 5.8.9.1a.1;

2> release the SRBs of this destination, according to clause 5.8.9.1a.3;

2> release the PC5 Relay RLC channels of this destination if configured, in according to clause 5.8.9.7.1;

2> discard the NR sidelink communication related configuration of this destination;

2> reset the sidelink specific MAC of this destination;

2> consider the PC5-RRC connection is released for the destination;

2> indicate the release of the PC5-RRC connection to the upper layers for this destination (i.e. PC5 is unavailable);

2> if UE is in RRC\_CONNECTED:

3> if the UE is acting as L2 U2N Remote UE:

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

3> else:

4> perform the sidelink UE information for NR sidelink communication procedure, as specified in 5.8.3.3;

NOTE: It is up to UE implementation on whether and how to indicate to upper layers to maintain the keep-alive procedure [55].

#### 5.8.9.4 Sidelink common control information

##### 5.8.9.4.1 General

The sidelink common control information is carried by *MasterInformationBlockSidelink*. The sidelink common control information may change at any transmission, i.e. neither a modification period nor a change notification mechanism is used. This procedure also applies to NR sidelink discovery.

A UE configured to receive or transmit NR sidelink communication/discovery shall:

1> if the UE has a selected SyncRef UE, as specified in 5.8.6:

2> ensure having a valid version of the *MasterInformationBlockSidelink* message of that SyncRef UE;

##### 5.8.9.4.2 Actions related to reception of *MasterInformationBlockSidelink* message

Upon receiving *MasterInformationBlockSidelink*, the UE shall:

1> apply the values included in the received *MasterInformationBlockSidelink* message.

##### 5.8.9.4.3 Transmission of *MasterInformationBlockSidelink* message

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

1> if in coverage on the frequency used for the NR sidelink communication as defined in TS 38.304 [20].

2> set *inCoverage* to *true*;

2> if *tdd-UL-DL-ConfigurationCommon* is included in the received *SIB1*:

3> set *sl-TDD-Config* to the value representing the same meaning as that is included in *tdd-UL-DL-ConfigurationCommon,* as described in TS 38.213, clause 16.1 [13];

2> else:

3> set *sl-TDD-Config* to the value as specified in TS 38.213 [13], clause 16.1;

2> if *syncInfoReserved* is included in an entry of configured *sl-SyncConfigList* corresponding to the concerned frequency from the received *SIB12:*

3> set *reservedBits* to the value of *syncInfoReserved* in the received *SIB12*;

2> else*:*

3> set all bits in *reservedBits* to 0;

1> else if out of coverage on the frequency used for NR sidelink communication as defined in TS 38.304 [20]; and the concerned frequency is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* or in *sl-FreqInfoList* within *SIB12*:

2> set *inCoverage* to *true*;

2> set *reservedBits* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SidelinkPreconfigNR* defined in 9.3);

2> set *sl-TDD-Config* to the value representing the same meaning as that is included in the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SL-PreconfigurationNR* defined in 9.3) as described in TS 38.213, clause 16.1 [13];

1> else if out of coverage on the frequency used for NR sidelink communication as defined in TS 38.304 [20]; and the UE selects GNSS as the synchronization reference and *sl-SSB-TimeAllocation3* is not configured for the frequency used in *SidelinkPreconfigNR*:

2> set *inCoverage* to *true*;

2> set *reservedBits* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SidelinkPreconfigNR* defined in 9.3);

2> set *sl-TDD-Config* to the value representing the same meaning as that is included in the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SL-PreconfigurationNR* defined in 9.3) as described in TS 38.213, clause 16.1 [13];

1> else if the UE has a selected SyncRef UE (as defined in 5.8.6):

2> set *inCoverage* to *false*;

2> set *sl-TDD-Config* and *reservedBits* to the value of the corresponding field included in the received *MasterInformationBlockSidelink*;

1> else:

2> set *inCoverage* to *false*;

2> set *reservedBits* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SidelinkPreconfigNR* defined in 9.3);

2> set *sl-TDD-Config* to the value representing the same meaning as that is included in the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SL-PreconfigurationNR* defined in 9.3) as described in TS 38.213, clause 16.1 [13];

1> set *directFrameNumber* and *slotIndex* according to the slot used to transmit the SLSS, as specified in 5.8.5.3;

1> submit the *MasterInformationBlockSidelink* to lower layers for transmission upon which the procedure ends;

#### 5.8.9.5 Actions related to PC5-RRC connection release requested by upper layers or AS layer

The UE initiates the procedure when upper layers request the release of the PC5-RRC connection as specified in TS 24.587 [57] or TS 24.554 [72], or when AS layer releases the PC5-RRC connection as specified in 5.3.5.5.2, 5.3.5.16.2, 5.3.7.2, and 5.8.9.10.4. The UE shall not initiate the procedure for power saving purposes.

The UE shall:

1> if the PC5-RRC connection release for the specific destination is released by AS layer or requested by upper layers:

2> discard the NR sidelink communication related configuration of this destination;

2> release the DRBs of this destination if configured, in according to clause 5.8.9.1a.1;

2> release the SRBs of this destination, in according to clause 5.8.9.1a.3;

2> release the PC5 Relay RLC channels if configured, in according to clause 5.8.9.7.1;

2> reset the sidelink specific MAC of this destination.

2> consider the PC5-RRC connection is released for the destination;

1> if the PC5-RRC connection release is initiated at the AS:

2> indicate the upper layers the PC5-RRC connection is released for the destination;

#### 5.8.9.6 Sidelink UE assistance information

##### 5.8.9.6.1 General



Figure 5.8.9.6.1-1: Sidelink UE assistance information

The purpose of this procedure is for a UE to inform its peer UE of the sidelink DRX assistance information used to determine the sidelink DRX configuration for unicast communication.

For sidelink unicast, a UE may include its desired sidelink DRX configurations in the *UEAssistanceInformationSidelink* as the sidelink DRX assistance information which is transmitted to its peer UE.

NOTE: It is up to UE implementation to determine its desired sidelink DRX configurations for unicast communication.

##### 5.8.9.6.2 Initiation

For sidelink unicast, if both a RX UE and its peer TX UE for a direction of sidelink communication are capable of sidelink DRX, the RX UE that is interested in sending the sidelink DRX assistance information may send the *UEAssistanceInformationSidelink* as the sidelink DRX assistance information to its peer UE when the sidelink DRX assistance information has not been sent previously or when the previously transmitted sidelink DRX assistance information has changed.

##### 5.8.9.6.3 Actions related to reception of *UEAssistanceInformationSidelink* message

For sidelink unicast, when a UE is in RRC\_CONNECTED and is performing sidelink operation with resource allocation mode 1, it may report the sidelink DRX assistance information received within the *UEAssistanceInformationSidelink* from its peer UE to the network as specified in 5.8.3. For sidelink unicast, when a UE is in RRC\_CONNECTED and is performing sidelink operation with resource allocation mode 2 or is in RRC\_IDLE or RRC\_INACTIVE or out of coverage, regardless of whether the UE has obtained the sidelink DRX assistance information from the *UEAssistanceInformationSidelink* transmitted from its peer UE or not, it may determine the sidelink DRX configuration *SL-DRX-ConfigUC* for its peer UE.

NOTE: When UE determines the sidelink DRX configuration for its peer UE, it may take the sidelink DRX assistance information received from its peer UE into account.

5.8.9.7 PC5 Relay RLC channel management for L2 U2N relay

5.8.9.7.1 PC5 Relay RLC channel release

The UE shall:

1> if the PC5 Relay RLC channel release was triggered after the reception of the *RRCReconfigurationSidelink* message; or

1> after receiving the *RRCReconfigurationCompleteSidelink* message, if the PC5 Relay RLC channel release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*:

2> for each *sl-RLC-ChannelID* in *sl-RLC-ChannelToReleaseList* received in *sl-ConfigDedicatedNR* within *RRCReconfiguration* or for each *sl-RLC-ChannelID-PC5* included in the received *sl-RLC-ChannelToReleaseListPC5* that is part of the current UE sidelink configuration:

3> release the RLC entity and the corresponding logical channel associated with the *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5*;

1> if the PC5 Relay RLC channel release was triggered for a specific destination by upper layers as specified in 5.8.9.5:

2> release the RLC entity and the corresponding logical channel associated with the *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5* of the specific destination;

5.8.9.7.2 PC5 Relay RLC channel addition/modification

Upon PC5-RRC connection establishment between the L2 U2N Relay UE and L2 U2N Remote UE, the L2 U2N Relay UE shall:

1> apply RLC specified configuration of SL-RLC0 as specified in clause 9.1.1.4:

1> apply RLC default configuration of SL-RLC1 as specified in clause 9.2.4 if the L2 U2N Relay UE is in RRC\_IDLE/INACTIVE state;

The UE shall:

1> if the PC5 Relay RLC channel addition/modification was trigggered due to the reception of the *RRCReconfigurationSidelink* message; or

1> after receiving the *RRCReconfigurationCompleteSidelink* message, if the PC5 Relay RLC channel addition/modification was triggered due to the configuration received within the *sl-ConfigDedicatedNR*:

2> if the current configuration contains a PC5 Relay RLC channel with the received *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5*:

3> reconfigure the sidelink RLC entity in accordance with the received *sl-RLC-Config* or *sl-RLC-ConfigPC5*;

3> reconfigure the sidelink MAC entity with a logical channel in accordance with the received *sl-MAC-LogicalChannelConfig* or *sl-MAC-LogicalChannelConfigPC5*;

2> else (a PC5 Relay RLC channel with the received *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5* was not configured before):

3> establish a sidelink RLC entity in accordance with the received *sl-RLC-Config* or *sl-RLC-ConfigPC5*;

3> configure the sidelink MAC entity with a logical channel in accordance with the received *sl-MAC-LogicalChannelConfig* or *sl-MAC-LogicalChannelConfigPC5*.

#### 5.8.9.8 Remote UE information

##### 5.8.9.8.1 General



Figure 5.8.9.8.1-1: Remote UE information

This procedure is used by the L2 U2N Remote UE in RRC\_IDLE/RRC\_INACTIVE to inform about the required SIB(s) and provide Paging related information to the connected L2 U2N Relay UE.

NOTE: MIB is not required by a L2 U2N Remote UE.

##### 5.8.9.8.2 Actions related to transmission of *RemoteUEInformationSidelink* message

When entering RRC\_IDLE or RRC\_INACTIVE, or upon change in any of the information in the *RemoteUEInformationSidelink* while in RRC\_IDLE or RRC\_INACTIVE, the L2 U2N Remote UE shall:

1> if the UE has not stored a valid version of a SIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) in accordance with clause 5.2.2.1 and the requested SIB has not been indicated in *RemoteUEInformationSidelink* message to the L2 U2N Relay UE before, or:

1> if the UE becomes not interested in the requested SIB, which has been indicated in *RemoteUEInformationSidelink* message to the L2 U2N Relay UE before;

2> include *sl-RequestedSI-List* in the *RemoteUEInformationSidelink* to indicate the requested SIB(s);

1> if the UE has not sent *sl-PagingInfo-RemoteUE* in the *RemoteUEInformationSidelink* message to the L2 U2N Relay UE before,set *sl-PagingInfo-RemoteUE* as follows:

2> if the L2 U2N Remote UE is in RRC\_IDLE:

3> include *ng-5G-S-TMSI* in the *sl-PagingIdentityRemoteUE*;

3> if the UE specific DRX cycle is configured by upper layer, set *sl-PagingCycleRemoteUE* to the value of UE specific Uu DRX cycle configured by upper layer*;*

2> else if the L2 U2N Remote UE is in RRC\_INACTIVE:

3> include *ng-5G-S-TMSI* and *fullI-RNTI* in the *sl-PagingIdentityRemoteUE*;

3> if the UE specific DRX cycle is configured by upper layer,

4> set *sl-PagingCycleRemoteUE* to the minimum value of UE specific Uu DRX cycles (configured by upper layer and configured by RRC)*;*

3> else:

4> set *sl-PagingCycleRemoteUE* to the value of UE specific DRX cycle configured by RRC;

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

When entering RRC\_CONNECTED, if L2 U2N remote UE had sent *sl-RequestedSIB-List* and/or *sl-PagingInfo-RemoteUE,* the L2 U2N Remote UE shall:

1> set the *sl-RequestedSIB-List* to the value *release* if requested before;

1> set the *sl-PagingInfo-RemoteUE* to the value *release* if sent before;

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

##### 5.8.9.8.3 Reception of *RemoteUEInformationSidelink* message by the L2 U2N Relay UE

The L2 U2N Relay UE shall:

1> if the *RemoteUEInformationSidelink* includes the *sl-PagingInfo-RemoteUE*:

2> if the UE is in RRC\_CONNECTED on an active BWP with common search space configured including *pagingSearchSpace*; or

2> if the UE is in RRC\_IDLE or RRC\_INACTIVE:

3> if the *sl-PagingInfo-RemoteUE* is set to *setup*:

4> monitor the *Paging* message at the L2 U2N Remote UE's paging occasion calculated according to *sl-PagingIdentityRemoteUE* and *sl-PagingCycleRemoteUE* included in *sl-PagingInfo-RemoteUE*;

3> else (the *sl-PagingInfo-RemoteUE* is set to *release*):

4> stop monitoring the *Paging* message at the L2 U2N Remote UE's paging occasion;

4> release the received paging information in *sl-PagingInfo-RemoteUE*;

2> else (the UE is in RRC\_CONNECTED on an active BWP without *pagingSearchSpace* configured):

3> if the *sl-PagingInfo-RemoteUE* is set to *setup*:

4> include the received *sl-PagingIdentityRemoteUE* in *SidelinkUEInformationNR* message and perform Sidelink UE information transmission in accordance with 5.8.3;

3> else (the *sl-PagingInfo-RemoteUE* is set to *release*):

4> initiate transmission of the *SidelinkUEInformationNR* message to release the *sl-PagingIdentityRemoteUE* in *SidelinkUEInformationNR* message in accordance with 5.8.3;

4> release the received paging information in *sl-PagingInfo-RemoteUE*;

1> if the *RemoteUEInformationSidelink* includes the *sl-RequestedSIB-List*:

2> if the *sl-RequestedSIB-List* is set to *setup*:

3> if the L2 U2N Relay UE has not stored a valid version of SIB(s) indicated in *sl-RequestedSIB-List*:

4> perform acquisition of the system information indicated in *sl-RequestedSIB-List* in accordance with 5.2.2;

3> else:

4> perform the Uu message transfer procedure in accordance with 5.8.9.9;

2> if the *sl-RequestedSIB-List* is set to *release*:

3> release received SIB request in *sl-RequestedSIB-List*.

#### 5.8.9.9 Uu message transfer in sidelink

##### 5.8.9.9.1 General



Figure 5.8.9.9.1-1: Uu message transfer in sidelink

The purpose of this procedure is to transfer *Paging* message and System Information from the L2 U2N Relay UE to the L2 U2N Remote UE in RRC\_IDLE/RRC\_INACTIVE.

##### 5.8.9.9.2 Actions related to transmission of *UuMessageTransferSidelink* message

The L2 U2N Relay UE initiates the Uu message transfer procedure when at least one of the following conditions is met:

1> upon receiving *Paging* message related to the connected L2 U2N Remote UE from network (including *Paging* message within *RRCReconfiguration* message);

1> upon acquisition of the SIB(s) requested by the connected L2 U2N Remote UE (as indicated in *sl-RequestedSIB-List* in the *RemoteUEInformationSidelink*) or upon receiving the updated SIB(s) from network which has been requested by the connected L2 U2N Remote UE;

1> upon unsolicited SIB1 forwarding to the connected L2 U2N Remote UE or upon receiving the updated *SIB1* from network;

For each associated L2 U2N Remote UE, the L2 U2N Relay UE shall set the contents of *UuMessageTransferSidelink* message as follows:

1> include *sl-PagingDelivery* if the *Paging* message received from network containing the *ue-Identity* of the L2 U2N Remote UE;

1> include *sl-SIB1-Delivery* if any of the conditions for initiating Uu message transfer procedure related to SIB1 are met;

1> include *sl-SystemInformationDelivery* if any of the conditions for initiating Uu message transfer procedure related to System Information are met;

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

NOTE: The L2 U2N Relay UE may perform unsolicited forwarding of SIB1 to the L2 U2N Remote UE based on UE implementation.

##### 5.8.9.9.3 Reception of the *UuMessageTransferSidelink*

Upon receiving the *UuMessageTransferSidelink* message, the L2 U2N Remote UE shall:

1> if *sl-PagingDelivery* is included:

2> perform the paging reception procedure as specified in clause 5.3.2.3;

1> if *sl-SystemInformationDelivery* and/or *sl-SIB1-Delivery* is included:

2> perform the actions specified in clause 5.2.2.4.

#### 5.8.9.10 Notification Message

##### 5.8.9.10.1 General



Figure 5.8.9.8.1-1: Notification message in sidelink

This procedure is used by a U2N Relay UE to send notification to the connected U2N Remote UE.

##### 5.8.9.10.2 Initiation

The U2N Relay UE may initiate the procedure when one of the following conditions is met:

1> upon Uu RLF as specified in 5.3.10;

1> upon reception of an *RRCReconfiguration* including the *reconfigurationWithSync*;

1> upon cell reselection;

1> upon L2 U2N Relay UE's RRC connection failure including RRC connection reject as specified in 5.3.3.5 and 5.3.13.10, and T300 expiry as specified in 5.3.3.7, and RRC resume failure as specified in 5.3.13.5;

##### 5.8.9.10.3 Actions related to transmission of *NotificationMessageSidelink* message

The U2N Relay UE shall set the indication type as follows:

1> if the UE initiates transmission of the *NotificationMessageSidelink* message due to Uu RLF:

2> set the *indicationType* as *relayUE-Uu-RLF*;

1> else if the UE initiates transmission of the *NotificationMessageSidelink* message due to reconfiguration with sync:

2> set the *indicationType* as *relayUE-HO*;

1> else if the UE initiates transmission of the *NotificationMessageSidelink* message due to cell reselection:

2> set the *indicationType* as *relayUE-CellReselection*;

1> if the UE initiates transmission of the *NotificationMessageSidelink* message due to Uu RRC connection establishment/Resume failure:

2> set the *indicationType* as *relayUE-Uu-RRC-Failure*;

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

##### 5.8.9.10.4 Actions related to reception of *NotificationMessageSidelink* message

Upon receiving the *NotificationMessageSidelink*, the U2N Remote UE shall:

1> if the *indicationType* is included:

2> if the UE is L2 U2N Remote UE in RRC\_CONNECTED:

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

2> else (the UE is L3 U2N Remote UE, or L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE):

3> if the PC5-RRC connection with the U2N Relay UE is determined to be released:

4> perform the PC5-RRC connection release as specified in 5.8.9.5.

3> else (i.e., maintain the PC5 RRC connection):

4> if the UE is L2 U2N Remote UE and the *indicationType* is *relayUE-HO or relayUE-CellReselection*:

5> consider cell re-selection occurs;

NOTE: For L3 U2N Remote UE, or L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE, it is up to Remote UE implementation whether to release or keep the PC5 unicast link.

### 5.8.10 Sidelink measurement

#### 5.8.10.1 Introduction

The UE may configure the associated peer UE to perform NR sidelink measurement and report on the corresponding PC5-RRC connection in accordance with the NR sidelink measurement configuration for unicast by *RRCReconfigurationSidelink* message.

The NR sidelink measurement configuration includes the following parameters for a PC5-RRC connection:

**1. NR sidelink measurement objects:** Object(s) on which the associated peer UE shall perform the NR sidelink measurements.

- For NR sidelink measurement, a NR sidelink measurement object indicates the NR sidelink frequency of reference signals to be measured.

**2. NR sidelink reporting configurations:** NR sidelink measurement reporting configuration(s) where there can be one or multiple NR sidelink reporting configurations per NR sidelink measurement object. Each NR sidelink reporting configuration consists of the following:

- Reporting criterion: The criterion that triggers the UE to send a NR sidelink measurement report. This can either be periodical or a single event description.

- RS type: The RS that the UE uses for NR sidelink measurement results. In this release, only DMRS is supported for NR sidelink measurement.

- Reporting format: The quantities that the UE includes in the measurement report. In this release, only RSRP measurement is supported.

**3. NR sidelink measurement identities:** A list of NR sidelink measurement identities where each NR sidelink measurement identity links one NR sidelink measurement object with one NR sidelink reporting configuration. By configuring multiple NR sidelink measurement identities, it is possible to link more than one NR sidelink measurement object to the same NR sidelink reporting configuration, as well as to link more than one NR sidelink reporting configuration to the same NR sidelink measurement object. The NR sidelink measurement identity is also included in the NR sidelink measurement report that triggered the reporting, serving as a reference to the network.

**4. NR sidelink quantity configurations:** The NR sidelink quantity configuration defines the NR sidelink measurement filtering configuration used for all event evaluation and related reporting, and for periodical reporting of that NR sidelink measurement. In each configuration, different filter coefficients can be configured for different NR sidelink measurement quantities.

Both UEs of the PC5-RRC connection maintains a NR sidelink measurement object list, a NR sidelink reporting configuration list, and a NR sidelink measurement identities list according to signalling and procedures in this specification.

#### 5.8.10.2 Sidelink measurement configuration

##### 5.8.10.2.1 General

The UE shall:

1> if the received *sl-MeasConfig* includes the *sl-MeasObjectToRemoveList* in the *RRCReconfigurationSidelink*:

2> perform the sidelink measurement object removal procedure as specified in 5.8.10.2.4;

1> if the received *sl-MeasConfig* includes the *sl-MeasObjectToAddModList* in the *RRCReconfigurationSidelink*:

2> perform the sidelink measurement object addition/modification procedure as specified in 5.8.10.2.5;

1> if the received *sl-MeasConfig* includes the *sl-ReportConfigToRemoveList* in the *RRCReconfigurationSidelink*:

2> perform the sidelink reporting configuration removal procedure as specified in 5.8.10.2.6;

1> if the received *sl-MeasConfig* includes the *sl-ReportConfigToAddModList* in the *RRCReconfigurationSidelink*:

2> perform the sidelink reporting configuration addition/modification procedure as specified in 5.8.10.2.7;

1> if the received *sl-MeasConfig* includes the *sl-QuantityConfig* in the *RRCReconfigurationSidelink*:

2> perform the sidelink quantity configuration procedure as specified in 5.8.10.2.8;

1> if the received *sl-MeasConfig* includes the *sl-MeasIdToRemoveList* in the *RRCReconfigurationSidelink*:

2> perform the sidelink measurement identity removal procedure as specified in 5.8.10.2.2;

1> if the received *sl-MeasConfig* includes the *sl-MeasIdToAddModList* in the *RRCReconfigurationSidelink*:

2> perform the sidelink measurement identity addition/modification procedure as specified in 5.8.10.2.3;

##### 5.8.10.2.2 Sidelink measurement identity removal

The UE shall:

1> for each *sl-MeasId* included in the received *sl-MeasIdToRemoveList* that is part of the current UE configuration in *VarMeasConfigSL*:

2> remove the entry with the matching *sl-MeasId* from the *sl-MeasIdList* within the *VarMeasConfigSL*;

2> remove the NR sidelink measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;

2> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.

NOTE: The UE does not consider the message as erroneous if the *sl-MeasIdToRemoveList* includes any *sl-MeasId* value that is not part of the current UE configuration.

##### 5.8.10.2.3 Sidelink measurement identity addition/modification

The UE shall:

1> for each *sl-MeasId* included in the received *sl-MeasIdToAddModList*:

2> if an entry with the matching *sl-MeasId* exists in the *sl-MeasIdList* within the *VarMeasConfigSL*:

3> replace the entry with the value received for this *sl-MeasId*;

2> else:

3> add a new entry for this *sl-MeasId* within the *VarMeasConfigSL*;

2> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;

2> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*;

##### 5.8.10.2.4 Sidelink measurement object removal

The UE shall:

1> for each sl-MeasObjectId included in the received sl-MeasObjectToRemoveList that is part of sl-MeasObjectList in VarMeasConfigSL:

2> remove the entry with the matching *sl-MeasObjectId* from the *sl-MeasObjectList* within the *VarMeasConfigSL*;

2> remove all *sl-MeasId* associated with this *sl-MeasObjectId* from the *sl-MeasIdList* within the *VarMeasConfigSL*, if any;

2> if a *sl-MeasId* is removed from the *sl-MeasIdList*:

3> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;

3> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.

NOTE: The UE does not consider the message as erroneous if the *sl-MeasObjectToRemoveList* includes any *sl-MeasObjectId* value that is not part of the current UE configuration.

##### 5.8.10.2.5 Sidelink measurement object addition/modification

The UE shall:

1> for each *sl-MeasObjectId* included in the received *sl-MeasObjectToAddModList*:

2> if an entry with the matching *sl-MeasObjectId* exists in the *sl-MeasObjectList* within the *VarMeasConfigSL*, for this entry:

3> for each *sl-MeasId* associated with this *sl-MeasObjectId* included in the *sl-MeasIdList* within the *VarMeasConfigSL*, if any:

4> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;

4> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*;

3> reconfigure the entry with the value received for this *sl-MeasObject*;

2> else:

3> add a new entry for the received *sl-MeasObject* to the *sl-MeasObjectList* within *VarMeasConfigSL*.

##### 5.8.10.2.6 Sidelink reporting configuration removal

The UE shall:

1> for each *sl-ReportConfigId* included in the received *sl-ReportConfigToRemoveList* that is part of the current UE configuration in *VarMeasConfigSL*:

2> remove the entry with the matching *sl-ReportConfigId* from the *sl-ReportConfigList* within the *VarMeasConfigSL*;

2> remove all *sl-MeasId* associated with the *sl-ReportConfigId* from the *sl-MeasIdList* within the *VarMeasConfigSL*, if any;

2> if a *sl-MeasId* is removed from the *sl-MeasIdList*:

3> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;

3> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.

NOTE: The UE does not consider the message as erroneous if the *sl-ReportConfigToRemoveList* includes any *sl-ReportConfigId* value that is not part of the current UE configuration.

##### 5.8.10.2.7 Sidelink reporting configuration addition/modification

The UE shall:

1> for each sl-ReportConfigId included in the received sl-ReportConfigToAddModList:

2> if an entry with the matching *sl-ReportConfigId* exists in the *sl-ReportConfigList* within the *VarMeasConfigSL*, for this entry:

3> reconfigure the entry with the value received for this *sl-ReportConfig*;

3> for each *sl-MeasId* associated with this *sl-ReportConfigId* included in the *sl-MeasIdList* within the *VarMeasConfigSL*, if any:

4> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;

4> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*;

2> else:

3> add a new entry for the received *sl-ReportConfig* to the *sl-ReportConfigList* within the *VarMeasConfigSL*.

##### 5.8.10.2.8 Sidelink quantity configuration

The UE shall:

1> for each received *sl-QuantityConfig*:

2> set the corresponding parameter(s) in *sl-QuantityConfig* within *VarMeasConfigSL* to the value of the received *sl-QuantityConfig* parameter(s);

1> for each *sl-MeasId* included in the *sl-MeasIdList* within *VarMeasConfigSL*:

2> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;

2> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.

#### 5.8.10.3 Performing NR sidelink measurements

##### 5.8.10.3.1 General

A UE shall derive NR sidelink measurement results by measuring one or multiple DMRS associated per PC5-RRC connection as configured by the peer UE associated, as described in 5.8.10.3.2. For all NR sidelink measurement results the UE applies the layer 3 filtering as specified in clause 5.5.3.2, before using the measured results for evaluation of reporting criteria and measurement reporting. In this release, only NR sidelink RSRP can be configured as trigger quantity and reporting quantity.

The UE shall:

1> for each *sl-MeasId* included in the *sl-MeasIdList* within *VarMeasConfigSL*:

2> if the *sl-MeasObject* is associated to NR sidelink and the *sl-RS-Type* is set to *dmrs*:

3> derive the layer 3 filtered NR sidelink measurement result based on DMRS for the trigger quantity and each measurement quantity indicated in *sl-ReportQuantity* using parameters from the associated *sl-MeasObject*, as described in 5.8.10.3.2.

2> perform the evaluation of reporting criteria as specified in 5.8.10.4.

##### 5.8.10.3.2 Derivation of NR sidelink measurement results

The UE may be configured by the peer UE associated to derive NR sidelink RSRP measurement results per PC5-RRC connection associated to the NR sidelink measurement objects based on parameters configured in the *sl-MeasObject* and in the *sl-ReportConfig*.

The UE shall:

1> for each NR sidelink measurement quantity to be derived based on NR sidelink DMRS:

2> derive the corresponding measurement of NR sidelink frequency indicated quantity based on DMRS as described in TS 38.215 [9] in the concerned *sl-MeasObject*;

2> apply layer 3 filtering as described in 5.5.3.2;

#### 5.8.10.4 Sidelink measurement report triggering

##### 5.8.10.4.1 General

The UE shall:

1> for each *sl-MeasId* included in the *sl-MeasIdList* within *VarMeasConfigSL*:

2> if the *sl-ReportType* is set to *sl-EventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *sl-EventId* of the corresponding *sl-ReportConfig* within *VarMeasConfigSL*, is fulfilled for NR sidelink frequency for all NR sidelink measurements after layer 3 filtering taken during *sl-TimeToTrigger* defined for this event within the *VarMeasConfigSL*, while the *VarMeasReportListSL* does not include a NR sidelink measurement reporting entry for this *sl-MeasId* (a first NR sidelink frequency triggers the event):

3> include a NR sidelink measurement reporting entry within the *VarMeasReportListSL* for this *sl-MeasId*;

3> set the *sl-NumberOfReportsSent* defined within the *VarMeasReportListSL* for this *sl-MeasId* to 0;

3> include the concerned NR sidelink frequency in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId*;

3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5;

2> else if the *sl-ReportType* is set to *sl-EventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *sl-EventId* of the corresponding *sl-ReportConfig* within *VarMeasConfigSL*, is fulfilled for NR sidelink frequency not included in the *sl-FrequencyTriggeredList* for all NR sidelink measurements after layer 3 filtering taken during *sl-TimeToTrigger* defined for this event within the *VarMeasConfigSL* (a subsequent NR sidelink frequency triggers the event):

3> set the *sl-NumberOfReportsSent* defined within the *VarMeasReportListSL* for this *sl-MeasId* to 0;

3> include the concerned NR sidelink frequency in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId*;

3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5;

2> else if the *sl-ReportType* is set to *sl-EventTriggered* and if the leaving condition applicable for this event is fulfilled for NR sidelink frequency included in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId* for all NR sidelink measurements after layer 3 filtering taken during *sl-TimeToTrigger* defined within the *VarMeasConfigSL* for this event:

3> remove the concerned NR sidelink frequency in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId*;

3> if *sl-ReportOnLeave* is set to *true* for the corresponding reporting configuration:

4> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5;

3> if the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId* is empty:

4> remove the NR sidelink measurement reporting entry within the *VarMeasReportListSL* for this *sl-MeasId*;

4> stop the periodical reporting timer for this *sl-MeasId*, if running;

2> if *sl-ReportType* is set to *sl-Periodical* and if a (first) NR sidelink measurement result is available:

3> include a NR sidelink measurement reporting entry within the *VarMeasReportListSL* for this *sl-MeasId*;

3> set the *sl-NumberOfReportsSent* defined within the *VarMeasReportListSL* for this *sl-MeasId* to 0;

3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5, immediately after the quantity to be reported becomes available for the NR sidelink frequency:

2> upon expiry of the periodical reporting timer for this *sl-MeasId*:

3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5.

##### 5.8.10.4.2 Event S1 (Serving becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition S1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition S1-2, as specified below, is fulfilled;

1> for this NR sidelink measurement, consider the NR sidelink frequency corresponding to the associated *sl-MeasObject* associated with this event.

Inequality S1-1 (Entering condition)

*Ms – Hys > Thresh*

Inequality S1-2 (Leaving condition)

*Ms + Hys < Thresh*

The variables in the formula are defined as follows:

***Ms*** is the NR sidelink measurement result of the NR sidelink frequency, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *sl-Hysteresis* as defined within *sl-ReportConfig* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *s1-Threshold* as defined within *sl-ReportConfig* for this event).

***Ms*** is expressed in dBm in case of RSRP.

***Hys*** is expressed in dB.

***Thresh*** is expressed in the same unit as ***Ms***.

##### 5.8.10.4.3 Event S2 (Serving becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition S2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition S2-2, as specified below, is fulfilled;

1> for this NR sidelink measurement, consider the NR sidelink frequency indicated by the *sl-MeasObject* associated to this event.

Inequality S2-1 (Entering condition)

*Ms + Hys < Thresh*

Inequality S2-2 (Leaving condition)

*Ms – Hys > Thresh*

The variables in the formula are defined as follows:

***Ms*** is the NR sidelink measurement result of the NR sidelink frequency, not taking into account any offsets.

***Hys*** is the hysteresis parameter for this event (i.e. *sl-Hysteresis* as defined within *sl-ReportConfig* for this event).

***Thresh*** is the threshold parameter for this event (i.e. *s2-Threshold* as defined within *sl-ReportConfig* for this event).

***Ms*** is expressed in dBm in case of RSRP.

***Hys*** is expressed in dB.

***Thresh*** is expressed in the same unit as ***Ms***.

#### 5.8.10.5 Sidelink measurement reporting

##### 5.8.10.5.1 General



Figure 5.8.10.5.1-1: NR sidelink measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to the peer UE associated.

For the *sl-MeasId* for which the NR sidelink measurement reporting procedure was triggered, the UE shall set the *sl-MeasResults* within the *MeasurementReportSidelink* message as follows:

1> set the *sl-MeasId* to the measurement identity that triggered the NR sidelink measurement reporting;

1> if the *sl-ReportConfig* associated with the *sl-MeasId* that triggered the NR sidelink measurement reporting is set to *sl-EventTriggered* or *sl-Periodical*:

2> set *sl-ResultDMRS* within *sl-MeasResult* to include the NR sidelink DMRS based quantity indicated in the *sl-ReportQuantity* within the concerned *sl-ReportConfig*;

1> increment the *sl-NumberOfReportsSent* as defined within the *VarMeasReportListSSL* for this *sl-MeasId* by 1;

1> stop the periodical reporting timer, if running;

1> if the *sl-NumberOfReportsSent* as defined within the *VarMeasReportListSL* for this *sl-MeasId* is less than the *sl-ReportAmount* as defined within the corresponding *sl-ReportConfig* for this *sl-MeasId*:

2> start the periodical reporting timer with the value of *sl-ReportInterval* as defined within the corresponding *sl-ReportConfig* for this *sl-MeasId*;

1> else:

2> if the *sl-ReportType* is set to *sl-Periodical*:

3> remove the entry within the *VarMeasReportListSL* for this *sl-MeasId*;

3> remove this *sl-MeasId* from the *sl-MeasIdList* within *VarMeasConfigSL*;

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

### 5.8.11 Zone identity calculation

The UE shall determine an identity of the zone (i.e. Zone\_id) in which it is located using the following formulae, if *sl-ZoneConfig* is configured:

*x*1= Floor (*x* / *L*) Mod 64;

*y*1= Floor (*y* / *L*) Mod 64;

Zone\_id = *y*1 \* 64 + *x*1.

The parameters in the formulae are defined as follows:

**L** is the value of *sl-ZoneLength* included in *sl-ZoneConfig*;

**x** is the geodesic distance in longitude between UE's current location and geographical coordinates (0, 0) according to WGS84 model [58] and it is expressed in meters;

**y** is the geodesic distance in latitude between UE's current location and geographical coordinates (0, 0) according to WGS84 model [58] and it is expressed in meters.

NOTE: How the calculated zone\_id is used is specified in TS 38.321 [3].

### 5.8.12 DFN derivation from GNSS

When the UE selects GNSS as the synchronization reference source, the DFN, the subframe number within a frame and slot number within a frame used for NR sidelink communication/discovery are derived from the current UTC time, by the following formulae:

*DFN*= Floor (0.1\*(*Tcurrent* –*Tref–OffsetDFN*)) mod 1024

*SubframeNumber*= Floor (*Tcurrent* –*Tref–OffsetDFN*) mod 10

*SlotNumber*= Floor ((*Tcurrent* –Tref–*OffsetDFN*)\*2μ) mod (10\*2μ)

Where:

***Tcurrent*** is the current UTC time obtained from GNSS. This value is expressed in milliseconds;

***Tref*** is the reference UTC time 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Thursday, December 31, 1899 and Friday, January 1, 1900). This value is expressed in milliseconds;

***OffsetDFN*** is the value *sl-OffsetDFN* if configured, otherwise it is zero. This value is expressed in milliseconds.

μ=0/1/2/3 corresponding to the 15/30/60/120 kHz of SCS for SL, respectively.

NOTE 1: In case of leap second change event, how UE obtains the scheduled time of leap second change to adjust *Tcurrent* correspondingly is left to UE implementation. How UE handles to avoid the sudden discontinuity of DFN is left to UE implementation.

NOTE 2: Void.

5.8.13 NR sidelink discovery

5.8.13.1 General

The purpose of this procedure is to perform NR sidelink discovery as specified in TS 23.304 [65].

5.8.13.2 NR sidelink discovery monitoring

A UE capable of NR sidelink discovery that is configured by upper layers to monitor NR sidelink discovery messages shall:

1> if the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* message and *sl-DiscConfig* is included in *RRCReconfiguration*; or if the frequency used for NR sidelink discovery is includedin *sl-FreqInfoList* included in *SIB12* and *sl-DiscConfigCommon* is included in *SIB12*:

2> if the UE is configured with *sl-DiscRxPool* for NR sidelink discovery reception included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):

3> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-DiscRxPool* for NR sidelink discovery reception in *RRCReconfiguration*;

2> else if the UE is configured with *sl-RxPool* for NR sidelink discovery reception included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):

3> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-RxPool* for NR sidelink discovery reception in *RRCReconfiguration*;

2> else if the cell chosen for NR sidelink discovery reception provides *SIB12*:

3> if *sl-DiscRxPool* for NR sidelink is included in *SIB12*:

4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-DiscRxPool* for NR sidelink discovery reception *in SIB12*;

3> else if *sl-RxPool* for NR sidelink is included in *SIB12*:

4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-RxPool* for NR sidelink discovery reception *in SIB12*;

1> else:

2> if out of coverage on the concerned frequency for NR sidelink discovery:

3> if *sl-DiscRxPool* was preconfigured:

4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool that was preconfigured by *sl-DiscRxPool* for NR sidelink discovery reception in *SL-PreconfigurationNR*, asdefined in clause 9.3;

3> else:

4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool that was preconfigured by *sl-RxPool* for NR sidelink discovery reception in *SL-PreconfigurationNR*, asdefined in clause 9.3;

NOTE: If *sl-DiscRxPool* and *sl-RxPool* are both include in SIB12 or preconfigured, it is up to UE implementation whether to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-RxPool* for NR sidelink discovery reception.

5.8.13.3 NR sidelink discovery transmission

A UE capable of NR sidelink discovery that is configured by upper layer to transmit NR sidelink discovery message shall:

1> if the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message and *sl-DiscConfig* is included in *RRCReconfiguration*; or if the frequency used for NR sidelink discovery is includedin *sl-FreqInfoList* within *SIB12* and *sl-DiscConfigCommon* is included in *SIB12*:

2> if the UE is in RRC\_CONNECTED and uses the frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message:

3> if the UE is acting as NR sidelink U2N Relay UE, and if the NR sidelink U2N Relay UE threshold conditions as specified in 5.8.14.2 are met based on *sl-RelayUE-Config*; or

3> if the UE is selecting NR sidelink U2N Relay UE / has a selected NR sidelink U2N Relay UE, and if the NR sidelink U2N Remote UE threshold conditions as specified in 5.8.15.2 are met based on *sl-RemoteUE-Config*; or

3> if the UE is performing NR sidelink non-relay discovery:

4> if the UE is configured with *sl-ScheduledConfig*:

5> if T310 for MCG or T311 is running; and if *sl-TxPoolExceptional* is included in *sl-FreqInfoList* for the concerned frequency in *SIB12* or included in *sl-ConfigDedicatedNR* in *RRCReconfiguration*; or

5> if T301 is running and the cell on which the UE initiated RRC connection re-establishment provides *SIB12* including *sl-TxPoolExceptional* for the concerned frequency; or

5> if T304 for MCG is running and the UE is configured with *sl-TxPoolExceptional* included in *sl-ConfigDedicatedNR* for the concerned frequency in *RRCReconfiguration*:

6> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the resource pool indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];

5> else:

6> configure lower layers to perform the sidelink resource allocation mode 1 using the resource pool indicated by *sl-DiscTxPoolScheduling* or *sl-TxPoolScheduling* for NR sidelink discovery transmission on the concerned frequency in *RRCReconfiguration*;

5> if T311 is running, configure the lower layers to release the resources indicated by *rrc-ConfiguredSidelinkGrant* (if any);

4> if the UE is configured with *sl-UE-SelectedConfig*:

5> if the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*, and if a result of sensing on the resources configured in *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* is not available in accordance with TS 38.214 [19]; or

5> if the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is not included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*, and a result of sensing on the resources configured in *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* is not available in accordance with TS 38.214 [19];

6> if *sl-TxPoolExceptional* for the concerned frequency is included in *RRCReconfiguration*; or

6> if the PCell provides *SIB12* including *sl-TxPoolExceptional* in *sl-FreqInfoList* for the concerned frequency:

7> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the resource pool indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];

5> else, if the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

6> configure lower layers to perform the sidelink resource allocation mode 2 based on sensing (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency in *RRCReconfiguration*;

5> else, if the *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:

6> configure lower layers to perform the sidelink resource allocation mode 2 based on sensing (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *RRCReconfiguration*;

2> else if the cell chosen for NR sidelink discovery transmission provides *SIB12*:

3> if the UE is acting as NR sidelink U2N Relay UE and if the NR sidelink U2N Relay UE threshold conditions as specified in 5.8.14.2 are met based on *sl-RelayUE-ConfigCommon* in *SIB12*; or

3> if the UE is selecting NR sidelink U2N Relay UE / has a selected NR sidelink U2N Relay UE and if the NR sidelink U2N Remote UE threshold conditions as specified in 5.8.15.2 are met based on *sl-RemoteUE-ConfigCommon* in *SIB12*; or

3> if the UE is performing NR sidelink non-relay discovery:

4> if *SIB12* includes *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency,and a result of sensing on the resources configured in the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission is available in accordance with TS 38.214 [19]:

5> configure lower layers to perform the sidelink resource allocation mode 2 based on sensing using the pools of resources indicated by *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency in *SIB12* as defined in TS 38.321 [3];

4> else if *SIB12* includes *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency,and a result of sensing on the resources configured in the *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission is available in accordance with TS 38.214 [19]:

5> configure lower layers to perform the sidelink resource allocation mode 2 based on sensing using the pools of resources indicated by *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *SIB12* as defined in TS 38.321 [3];

4> else if *SIB12* includes *sl-TxPoolExceptional* for the concerned frequency:

5> from the moment the UE initiates RRC connection establishment or RRC connection resume, until receiving an *RRCReconfiguration* including *sl-ConfigDedicatedNR*, or receiving an *RRCRelease* or an *RRCReject*; or

5> if a result of sensing on the resources configured in *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency in *SIB12* is not available in accordance with TS 38.214 [19]; or

5> if *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is not included in *SIB12* andif a result of sensing on the resources configured in *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *SIB12* is not available in accordance with TS 38.214 [19]:

6> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection (as defined in TS 38.321 [3]) using one of the pools of resources indicated by *sl-TxPoolExceptional* for the concerned frequency;

1> else if out of coverage on the concerned frequency for NR sidelink discovery:

2> if the UE is acting as L3 U2N Relay UE and if the NR sidelink U2N Relay UE threshold conditions as specified in 5.8.14.2 are met based on *sl-RelayUE-ConfigCommon* in *SidelinkPreconfigNR*; or

2> if the UE is selecting NR sidelink U2N Relay UE / has a selected NR sidelink U2N Relay UE and if the NR sidelink U2N Remote UE threshold conditions as specified in 5.8.15.2 are met based on *sl-RemoteUE-ConfigCommon* in *SidelinkPreconfigNR*; or

2> if the UE is performing NR sidelink non-relay discovery:

3> configure lower layers to perform the sidelink resource allocation mode 2 based on sensing (as defined in TS 38.321 [3] and TS 38.213 [13]) using the pools of resources indicated in *sl-DiscTxPoolSelected* or *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *SidelinkPreconfigNR*.

5.8.14 NR sidelink U2N Relay UE operation

5.8.14.1 General

This procedure is used by a UE supporting NR sidelink U2N Relay UE operation configured by upper layers to receive/ transmit NR sidelink discovery messages to evaluate AS layer conditions.

5.8.14.2 NR sidelink U2N Relay UE threshold conditions

A UE capable of NR sidelink U2N Relay UE operation shall:

1> if the threshold conditions specified in this clause were previously not met:

2> if *threshHighRelay* is not configured; or the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshHighRelay* by *hystMaxRelay* if configured; and

2> if *threshLowRelay* is not configured; or the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshLowRelay* by *hystMinRelay* if configured:

3> consider the threshold conditions to be met (entry);

1> else:

2> if the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshHighRelay* if configured; or

2> if the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshLowRelay* if configured;

3> consider the threshold conditions not to be met (leave);

5.8.15 NR sidelink U2N Remote UE operation

5.8.15.1 General

This procedure is used by a UE supporting NR sidelink U2N Remote UE operation configured by upper layers to receive/ transmit NR sidelink discovery message to evaluate AS layer conditions.

5.8.15.2 NR Sidelink U2N Remote UE threshold conditions

A UE capable of NR sidelink U2N Remote UE operation shall:

1> if the threshold conditions specified in this clause were previously not met:

2> if *threshHighRemote* is not configured; or the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshHighRemote* by *hystMaxRemote* if configured, or

2> if the UE has no serving cell:

3> consider the threshold conditions to be met (entry);

1> else:

2> if the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshHighRemote* if configured:

3> consider the threshold conditions not to be met (leave);

NOTE: The L2 U2N Remote UE considers the cell indicated by *sl-ServingCellInfo* in the *SL-AccessInfo-L2U2N-r17* received from the connected L2 U2N Relay UE as the camping cell.

5.8.15.3 Selection and reselection of NR sidelink U2N Relay UE

A UE capable of NR sidelink U2N Remote UE operation that is configured by upper layers to search for a NR sidelink U2N Relay UE shall:

1> if the UE has no serving cell; or

1> if the RSRP measurement of the cell on which the UE camps (for L2 and L3 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE)/ the PCell (for L3 U2N Remote UE in RRC\_CONNECTED) is below *threshHighRemote* within *sl-remoteUE-Config*:

2> if the UE does not have a selected NR sidelink U2N Relay UE; or

2> if the UE has a selected NR sidelink U2N Relay UE, and SL-RSRP of the currently selected NR sidelink U2N Relay UE is available and is below *sl-RSRP-Thresh*; or

2> if the UE has a selected NR sidelink U2N Relay UE, and SL-RSRP of the currently selected NR sidelink U2N Relay UE is not available, and SD-RSRP of the currently selected U2N Relay UE is below *sl-RSRP-Thresh*; or

NOTE 1: U2N Remote UE uses SL-RSRP measurements for relay reselection trigger evaluation when there is data transmission from U2N Relay UE to U2N Remote UE, and it is left to UE implementation whether to use SL-RSRP or SD-RSRP for relay reselection trigger evaluation in case of no data transmission from U2N Relay UE to U2N Remote UE. If SD-RSRP is used, the discovery procedure will be performed between the U2N Remote UE and the selected U2N Relay UE.

2> if the UE has a selected NR sidelink U2N Relay UE, and upper layers indicate not to use the currently selected NR sidelink U2N Relay UE; or

2> if the UE has a selected NR sidelink U2N Relay UE, and upper layers request the release of the PC5-RRC connection or when AS layer releases the PC5-RRC connection with the currently selected U2N Relay UE as specified in clause 5.8.9.5; or

2> if the UE has a selected NR sidelink U2N Relay UE, and sidelink radio link failure is detected on the PC5-RRC connection with the current U2N Relay UE as specified in clause 5.8.9.3:

3> perform NR sidelink discovery procedure as specified in clause 5.8.13 in order to search for candidate NR sidelink U2N Relay UEs;

4> when evaluating the one or more detected NR sidelink U2N Relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2N Relay UE ID and using the *sl-FilterCoefficientRSRP* in *SystemInformationBlockType12* (if in RRC\_IDLE/INACTIVE), the *sl-FilterCoefficientRSRP* in *sl-ConfigDedicatedNR* (if in RRC\_CONNECTED) or the preconfigured *sl-FilterCoefficientRSRP* as defined in 9.3 (out of coverage), before using the SD-RSRP measurement results;

4> consider a candidate NR sidelink U2N Relay UE for which SD-RSRP exceeds *sl-RSRP-Thresh* by *sl-HystMin* has met the AS criteria;

4> consider one of the available suitable NR sidelink U2N relay UE(s) can be selected;

NOTE 2: A candidate NR sidelink U2N Relay UE which meets all AS layer criteria defined in 5.8.15.3 and higher layer criteria defined in TS 23.304 [65] can be regarded as suitable NR sidelink U2N Relay UE by the NR sidelink U2N Remote UE. If multiple suitable NR sidelink U2N Relay UEs are available, it is up to Remote UE implementation to choose one NR sidelink U2N Relay UE. The details of the interaction with upper layers are up to UE implementation.

NOTE 3: For L2 U2N Remote UEs in RRC\_IDLE/INACTIVE and L3 U2N Remote UEs, the cell (re)selection procedure and relay (re)selection procedure run independently. If both suitable cells and suitable NR sidelink U2N Relay UEs are available, it is up to NR sidelink U2N Remote UE implementation to select either a cell or a NR sidelink U2N Relay UE. Furthermore, L3 U2N Remote UE's selection on both cell and NR sidelink U2N Relay UE is also based on UE implementation.

3> if the UE did not detect any candidate NR sidelink U2N Relay UE for which SD-RSRP exceeds *sl-RSRP-Thresh* by *sl-HystMin*:

4> consider no NR sidelink U2N Relay UE to be selected.

|  |
| --- |
| NEXT CHANGE |

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

### 6.3.1 System information blocks

#### – *SIB12*

SIB12 contains NR sidelink communication/discovery configuration.

*SIB12* information element

-- ASN1START

-- TAG-SIB12-START

SIB12-r16 ::= SEQUENCE {

segmentNumber-r16 INTEGER (0..63),

segmentType-r16 ENUMERATED {notLastSegment, lastSegment},

segmentContainer-r16 OCTET STRING

}

SIB12-IEs-r16 ::= SEQUENCE {

sl-ConfigCommonNR-r16 SL-ConfigCommonNR-r16,

lateNonCriticalExtension OCTET STRING OPTIONAL,

...,

[[

sl-DRX-ConfigCommonGC-BC-r17 SL-DRX-Config-GC-BC-r17 OPTIONAL, -- Need R

sl-DiscConfigCommon-r17 SL-DiscConfigCommon-r17 OPTIONAL, -- Need R

sl-L2U2N-Relay-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

sl-NonRelayDiscovery-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

sl-L3U2N-RelayDiscovery-r17 ENUMERATED {enabled} OPTIONAL, -- Need R

sl-TimersAndConstantsRemoteUE-r17 UE-TimersAndConstantsRemoteUE-r17 OPTIONAL -- Need R

]]

}

SL-ConfigCommonNR-r16 ::= SEQUENCE {

sl-FreqInfoList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16 OPTIONAL, -- Need R

sl-UE-SelectedConfig-r16 SL-UE-SelectedConfig-r16 OPTIONAL, -- Need R

sl-NR-AnchorCarrierFreqList-r16 SL-NR-AnchorCarrierFreqList-r16 OPTIONAL, -- Need R

sl-EUTRA-AnchorCarrierFreqList-r16 SL-EUTRA-AnchorCarrierFreqList-r16 OPTIONAL, -- Need R

sl-RadioBearerConfigList-r16 SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SL-RadioBearerConfig-r16 OPTIONAL, -- Need R

sl-RLC-BearerConfigList-r16 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16 OPTIONAL, -- Need R

sl-MeasConfigCommon-r16 SL-MeasConfigCommon-r16 OPTIONAL, -- Need R

sl-CSI-Acquisition-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

sl-OffsetDFN-r16 INTEGER (1..1000) OPTIONAL, -- Need R

t400-r16 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL, -- Need R

sl-MaxNumConsecutiveDTX-r16 ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32} OPTIONAL, -- Need R

sl-SSB-PriorityNR-r16 INTEGER (1..8) OPTIONAL -- Need R

}

SL-NR-AnchorCarrierFreqList-r16 ::= SEQUENCE (SIZE (1..maxFreqSL-NR-r16)) OF ARFCN-ValueNR

SL-EUTRA-AnchorCarrierFreqList-r16 ::= SEQUENCE (SIZE (1..maxFreqSL-EUTRA-r16)) OF ARFCN-ValueEUTRA

SL-DiscConfigCommon-r17 ::= SEQUENCE {

sl-RelayUE-ConfigCommon-r17 SL-RelayUE-Config-r17,

sl-RemoteUE-ConfigCommon-r17 SL-RemoteUE-Config-r17

}

-- TAG-SIB12-STOP

-- ASN1STOP

| *SIB12* field descriptions |
| --- |
| ***segmentContainer***  This field includes a segment of the encoded *SIB12-IEs*. The size of the included segment in this container should be small enough that the SIB message size is less than or equal to the maximum size of a NR SI, i.e. 2976 bits when SIB12 is broadcast. |
| ***segmentNumber***  This field identifies the sequence number of a segment of *SIB12-IEs*. A segment number of zero corresponds to the first segment, A segment number of one corresponds to the second segment, and so on. |
| ***segmentType***  This field indicates whether the included segment is the last segment or not. |
| ***sl-CSI-Acquisition***  This field indicates whether CSI reporting is enabled in sidelink unicast. If not set, SL CSI reporting is disabled. |
| ***sl-DRX-ConfigCommonGC-BC***  This field indicates the sidelink DRX configuration for groupcast and broadcast communication, as specified in TS 38.321 [3]. This field, if present, also indicates the gNB is capable of sidelink DRX. |
| ***sl-EUTRA-AnchorCarrierFreqList***  This field indicates the EUTRA anchor carrier frequency list, which can provide the NR sidelink communication configurations. |
| ***sl-FreqInfoList***  This field indicates the NR sidelink communication/discovery configuration on some carrier frequency (ies). In this release, only one entry can be configured in the list. |
| ***sl-L2U2N-Relay***  This field indicates the support of NR sidelink Layer-2 relay. |
| ***sl-L3U2N-RelayDiscovery***  This field indicates the support of L3 U2N relay AS-layer capability, i.e. NR sidelink relay discovery. |
| ***sl-MaxNumConsecutiveDTX***  This field indicates the maximum number of consecutive HARQ DTX before triggering sidelink RLF. Value n1 corresponds to 1, value n2 corresponds to 2, and so on. |
| ***sl-MeasConfigCommon***  This field indicates the measurement configurations (e.g. RSRP) for NR sidelink communication. |
| ***sl-NonRelayDiscovery***  This field indicates the support of NR sidelink non-relay discovery. |
| ***sl-NR-AnchorCarrierFreqList***  This field indicates the NR anchor carrier frequency list, which can provide the NR sidelink communication/discovery configurations. |
| ***sl-OffsetDFN***  Indicates the timing offset for the UE to determine DFN timing when GNSS is used for timing reference. Value 1 corresponds to 0.001 milliseconds, value 2 corresponds to 0.002 milliseconds, and so on. |
| ***sl-RadioBearerConfigList***  This field indicates one or multiple sidelink radio bearer configurations. |
| ***sl-RLC-BearerConfigList***  This field indicates one or multiple sidelink RLC bearer configurations. |
| ***sl-SSB-PriorityNR***  This field indicates the priority of NR sidelink SSB transmission and reception. |
| ***t400***  Indicates the value for timer T400 as described in clause 7.1. Value ms100 corresponds to 100 ms, value ms200 corresponds to 200 ms and so on. |

|  |
| --- |
| NEXT CHANGE |

### 6.3.2 Radio resource control information elements

– *BWP-DownlinkDedicated*

The IE *BWP-DownlinkDedicated* is used to configure the dedicated (UE specific) parameters of a downlink BWP.

***BWP-DownlinkDedicated* information element**

-- ASN1START

-- TAG-BWP-DOWNLINKDEDICATED-START

BWP-DownlinkDedicated ::= SEQUENCE {

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

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

sps-Config SetupRelease { SPS-Config } OPTIONAL, -- Need M

radioLinkMonitoringConfig SetupRelease { RadioLinkMonitoringConfig } OPTIONAL, -- Need M

...,

[[

sps-ConfigToAddModList-r16 SPS-ConfigToAddModList-r16 OPTIONAL, -- Need N

sps-ConfigToReleaseList-r16 SPS-ConfigToReleaseList-r16 OPTIONAL, -- Need N

sps-ConfigDeactivationStateList-r16 SPS-ConfigDeactivationStateList-r16 OPTIONAL, -- Need R

beamFailureRecoverySCellConfig-r16 SetupRelease {BeamFailureRecoveryRSConfig-r16} OPTIONAL, -- Cond SCellOnly

sl-PDCCH-Config-r16 SetupRelease { PDCCH-Config } OPTIONAL, -- Need M

sl-V2X-PDCCH-Config-r16 SetupRelease { PDCCH-Config } OPTIONAL -- Need M

]],

[[

preConfGapStatus-r17 BIT STRING (SIZE (maxNrofGapId-r17)) OPTIONAL, -- Cond PreConfigMG

beamFailureRecoverySpCellConfig-r17 SetupRelease { BeamFailureRecoveryRSConfig-r16} OPTIONAL, -- Cond SpCellOnly

harq-FeedbackEnablingforSPSactive-r17 BOOLEAN OPTIONAL, -- Need R

cfr-ConfigMulticast-r17 SetupRelease { CFR-ConfigMulticast-r17 } OPTIONAL, -- Need M

dl-PPW-PreConfigToAddModList-r17 DL-PPW-PreConfigToAddModList-r17 OPTIONAL, -- Need N

dl-PPW-PreConfigToReleaseList-r17 DL-PPW-PreConfigToReleaseList-r17 OPTIONAL, -- Need N

nonCellDefiningSSB-r17 NonCellDefiningSSB-r17 OPTIONAL, -- Need R

servingCellMO-r17 MeasObjectId OPTIONAL -- Cond MeasObject-NCDSSB

]]

}

SPS-ConfigToAddModList-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-Config

SPS-ConfigToReleaseList-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-ConfigIndex-r16

SPS-ConfigDeactivationState-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-ConfigIndex-r16

SPS-ConfigDeactivationStateList-r16 ::= SEQUENCE (SIZE (1..maxNrofSPS-DeactivationState)) OF SPS-ConfigDeactivationState-r16

DL-PPW-PreConfigToAddModList-r17 ::= SEQUENCE (SIZE (1..maxNrofPPW-Config-r17)) OF DL-PPW-PreConfig-r17

DL-PPW-PreConfigToReleaseList-r17 ::= SEQUENCE (SIZE (1..maxNrofPPW-Config-r17)) OF DL-PPW-ID-r17

-- TAG-BWP-DOWNLINKDEDICATED-STOP

-- ASN1STOP

|  |
| --- |
| ***BWP-DownlinkDedicated* field descriptions** |
| ***beamFailureRecoverySCellConfig***  Configuration of candidate RS for beam failure recovery in SCells. |
| ***beamFailureRecoverySpCellConfig***  Configuration of candidate RS for beam failure recovery in SpCells. |
| ***cfr-ConfigMulticast***  UE specific common frequency resource configuration for MBS multicast for one dedicated BWP. This field can be configured within at most one serving cell. |
| ***dl-PPW-PreConfigToAddModList***  Indicates a list of DL-PRS processing window configurations to be added or modified for the dedicated DL BWP. |
| ***dl-PPW-PreConfigToReleaseList***  Indicates a list of DL-PRS processing window configurations to be released for the dedicated DL BWP. |
| ***harq-FeedbackEnablingforSPSactive***  If enabled, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activation. Otherwise, UE follows configuration of HARQ feedback enabled/disabled corresponding to the first SPS PDSCH after activation. |
| ***nonCellDefiningSSB-r17***  If configured, the RedCap UE operating in this BWP uses this SSB for the purposes for which it would otherwise have used the cell-defining SSB of the serving cell (e.g. obtaining sync, measurements, RLM). Furthermore, other parts of the BWP configuration that refer to an SSB (e.g. the "SSB" configured in the *QCL-Info* IE; the "ssb-Index" configured in the *RadioLinkMonitoringRS*; *CFRA-SSB-Resource*; *PRACH-ResourceDedicatedBFR*) refer implicitily to this NCD-SSB.  The NCD-SSB has the same values for the properties (e.g., *ssb-PositionsInBurst*, *PCI*, *ssb-periodicity*, *ssb-PBCH-BlockPower*) of the corresponding CD-SSB apart from the values of the properties configured in the *NonCellDefiningSSB-r17* IE. |
| ***pdcch-Config***  UE specific PDCCH configuration for one BWP. |
| ***pdsch-Config***  UE specific PDSCH configuration for one BWP. |
| ***preConfGapStatus***  Indicates whether the pre-configured measurement gaps (i.e. the gaps configured with *preConfigInd*) are activated or deactivated upon the switch to this BWP. If this field is configured, the UE shall apply network-controlled mechanism for activation and deactivation of the pre-configured measurement gaps, otherwise the UE shall apply the autonomous activation/deactivation mechanism, as specified in TS 38.133 [14]. The first/leftmost bit corresponds to the measurement gap with gap ID 1, the second bit corresponds to measurement gap with gap ID 2, and so on. Value 0 indicates that the corresponding pre-configured measurement gap is deactivated while value 1 indicates that the corresponding pre-configured measurement gap is activated. The UE shall ignore the bit if the corresponding measurement gap is not a pre-configured measurement gap. |
| ***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 *nonCellDefiningSSB* in *BWP-DownlinkDedicated* of the associated downlink BWP: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* in the *nonCellDefiningSSB*. If the field is present in a downlink BWP and the BWP is activated, the RedCap UE uses this measurement object for serving cell measurements, otherwise, the RedCap UE uses the *servingCellMO* in *ServingCellConfig* IE. |
| ***sps-Config***  UE specific SPS (Semi-Persistent Scheduling) configuration for one BWP. Except for reconfiguration with sync, the NW does not reconfigure *sps-Config* when there is an active configured downlink assignment (see TS 38.321 [3]). However, the NW may release the *sps-Config* at any time. Network can only configure SPS in one BWP using either this field or *sps-ConfigToAddModList.* |
| ***sps-ConfigDeactivationStateList***  Indicates a list of the deactivation states in which each state can be mapped to a single or multiple SPS configurations to be deactivated, see clause 10.2 in TS 38.213 [13]. If a state is mapped to multiple SPS configurations, each of these SPS configurations is configured with the same *harq-CodebookID*. |
| ***sps-ConfigToAddModList***  Indicates a list of one or more DL SPS configurations to be added or modified in one BWP. Except for reconfiguration with sync, the NW does not reconfigure a SPS configuration when it is active (see TS 38.321 [3]). |
| ***sps-ConfigToReleaseList***  Indicates a list of one or more DL SPS configurations to be released. The NW may release a SPS configuration at any time. |
| ***radioLinkMonitoringConfig***  UE specific configuration of radio link monitoring for detecting cell- and beam radio link failure occasions. The maximum number of failure detection resources should be limited up to 8 for both cell and beam radio link failure detection. For SCells, only periodic 1-port CSI-RS can be configured in IE *RadioLinkMonitoringConfig*. |
| ***sl-PDCCH-Config***  Indicates the UE specific PDCCH configurations for receiving the SL grants (via SL-RNTI or SL-CS-RNTI) for NR sidelink communication/discovery***.*** |
| ***sl-V2X-PDCCH-Config***  Indicates the UE specific PDCCH configurations for receiving SL grants (i.e. sidelink SPS) for V2X sidelink communication***.*** |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *MeasObject-NCD-SSB* | This field is optionally present Need S if the UE is a RedCap UE and *nonCellDefiningSSB* is configured in this DL BWP. It is absent otherwise. |
| *PreConfigMG* | The field is optionally present, Need R, if there is at least one per UE gap configured with *preConfigInd* or there is at least one per FR gap of the same FR which the BWP belongs to and configured with *preConfigInd*. It is absent, Need R, otherwise. |
| *ScellOnly* | The field is optionally present, Need M, in the *BWP-DownlinkDedicated* of an Scell. It is absent otherwise. |
| *SpCellOnly* | The field is optionally present, Need M, in the *BWP-DownlinkDedicated* of an Spcell. It is absent otherwise. |

– *MeasObjectNR-SL*

The IE *MeasObjectNR-SL* concerns a measurement object including a list of transmission resource pool(s) for which CBR measurement is performed for NR sidelink communication/discovery.

***MeasObjectNR-SL* information element**

-- ASN1START

-- TAG-MEASOBJECTNR-SL-START

MeasObjectNR-SL-r16 ::= SEQUENCE {

tx-PoolMeasToRemoveList-r16 Tx-PoolMeasList-r16 OPTIONAL, -- Need N

tx-PoolMeasToAddModList-r16 Tx-PoolMeasList-r16 OPTIONAL -- Need N

}

Tx-PoolMeasList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-PoolToMeasureNR-r16)) OF SL-ResourcePoolID-r16

-- TAG-MEASOBJECTNR-SL-STOP

-- ASN1STOP

– *MeasResults*

The IE *MeasResults* covers measured results for intra-frequency, inter-frequency, inter-RAT mobility and measured results for NR sidelink communication/discovery.

***MeasResults* information element**

-- ASN1START

-- TAG-MEASRESULTS-START

MeasResults ::= SEQUENCE {

measId MeasId,

measResultServingMOList MeasResultServMOList,

measResultNeighCells CHOICE {

measResultListNR MeasResultListNR,

...,

measResultListEUTRA MeasResultListEUTRA,

measResultListUTRA-FDD-r16 MeasResultListUTRA-FDD-r16,

sl-MeasResultsCandRelay-r17 OCTET STRING -- Contains PC5 SL-MeasResultListRelay-r17

} OPTIONAL,

...,

[[

measResultServFreqListEUTRA-SCG MeasResultServFreqListEUTRA-SCG OPTIONAL,

measResultServFreqListNR-SCG MeasResultServFreqListNR-SCG OPTIONAL,

measResultSFTD-EUTRA MeasResultSFTD-EUTRA OPTIONAL,

measResultSFTD-NR MeasResultCellSFTD-NR OPTIONAL

]],

[[

measResultCellListSFTD-NR MeasResultCellListSFTD-NR OPTIONAL

]],

[[

measResultForRSSI-r16 MeasResultForRSSI-r16 OPTIONAL,

locationInfo-r16 LocationInfo-r16 OPTIONAL,

ul-PDCP-DelayValueResultList-r16 UL-PDCP-DelayValueResultList-r16 OPTIONAL,

measResultsSL-r16 MeasResultsSL-r16 OPTIONAL,

measResultCLI-r16 MeasResultCLI-r16 OPTIONAL

]],

[[

measResultRxTxTimeDiff-r17 MeasResultRxTxTimeDiff-r17 OPTIONAL,

sl-MeasResultServingRelay-r17 OCTET STRING OPTIONAL,

-- Contains PC5 SL-MeasResultRelay-r17

ul-PDCP-ExcessDelayResultList-r17 UL-PDCP-ExcessDelayResultList-r17 OPTIONAL,

coarseLocationInfo-r17 OCTET STRING OPTIONAL

]]

}

MeasResultServMOList ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF MeasResultServMO

MeasResultServMO ::= SEQUENCE {

servCellId ServCellIndex,

measResultServingCell MeasResultNR,

measResultBestNeighCell MeasResultNR OPTIONAL,

...

}

MeasResultListNR ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultNR

MeasResultNR ::= SEQUENCE {

physCellId PhysCellId OPTIONAL,

measResult SEQUENCE {

cellResults SEQUENCE{

resultsSSB-Cell MeasQuantityResults OPTIONAL,

resultsCSI-RS-Cell MeasQuantityResults OPTIONAL

},

rsIndexResults SEQUENCE{

resultsSSB-Indexes ResultsPerSSB-IndexList OPTIONAL,

resultsCSI-RS-Indexes ResultsPerCSI-RS-IndexList OPTIONAL

} OPTIONAL

},

...,

[[

cgi-Info CGI-InfoNR OPTIONAL

]] ,

[[

choCandidate-r17 ENUMERATED {true} OPTIONAL,

choConfig-r17 SEQUENCE (SIZE (1..2)) OF CondTriggerConfig-r16 OPTIONAL,

triggeredEvent-r17 SEQUENCE {

timeBetweenEvents-r17 TimeBetweenEvent-r17 OPTIONAL,

firstTriggeredEvent ENUMERATED {condFirstEvent, condSecondEvent} OPTIONAL

} OPTIONAL

]]

}

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

MeasResultEUTRA ::= SEQUENCE {

eutra-PhysCellId PhysCellId,

measResult MeasQuantityResultsEUTRA,

cgi-Info CGI-InfoEUTRA OPTIONAL,

...

}

MultiBandInfoListEUTRA ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicatorEUTRA

MeasQuantityResults ::= SEQUENCE {

rsrp RSRP-Range OPTIONAL,

rsrq RSRQ-Range OPTIONAL,

sinr SINR-Range OPTIONAL

}

MeasQuantityResultsEUTRA ::= SEQUENCE {

rsrp RSRP-RangeEUTRA OPTIONAL,

rsrq RSRQ-RangeEUTRA OPTIONAL,

sinr SINR-RangeEUTRA OPTIONAL

}

ResultsPerSSB-IndexList::= SEQUENCE (SIZE (1..maxNrofIndexesToReport2)) OF ResultsPerSSB-Index

ResultsPerSSB-Index ::= SEQUENCE {

ssb-Index SSB-Index,

ssb-Results MeasQuantityResults OPTIONAL

}

ResultsPerCSI-RS-IndexList::= SEQUENCE (SIZE (1..maxNrofIndexesToReport2)) OF ResultsPerCSI-RS-Index

ResultsPerCSI-RS-Index ::= SEQUENCE {

csi-RS-Index CSI-RS-Index,

csi-RS-Results MeasQuantityResults OPTIONAL

}

MeasResultServFreqListEUTRA-SCG ::= SEQUENCE (SIZE (1..maxNrofServingCellsEUTRA)) OF MeasResult2EUTRA

MeasResultServFreqListNR-SCG ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF MeasResult2NR

MeasResultListUTRA-FDD-r16 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultUTRA-FDD-r16

MeasResultUTRA-FDD-r16 ::= SEQUENCE {

physCellId-r16 PhysCellIdUTRA-FDD-r16,

measResult-r16 SEQUENCE {

utra-FDD-RSCP-r16 INTEGER (-5..91) OPTIONAL,

utra-FDD-EcN0-r16 INTEGER (0..49) OPTIONAL

}

}

MeasResultForRSSI-r16 ::= SEQUENCE {

rssi-Result-r16 RSSI-Range-r16,

channelOccupancy-r16 INTEGER (0..100)

}

MeasResultCLI-r16 ::= SEQUENCE {

measResultListSRS-RSRP-r16 MeasResultListSRS-RSRP-r16 OPTIONAL,

measResultListCLI-RSSI-r16 MeasResultListCLI-RSSI-r16 OPTIONAL

}

MeasResultListSRS-RSRP-r16 ::= SEQUENCE (SIZE (1.. maxCLI-Report-r16)) OF MeasResultSRS-RSRP-r16

MeasResultSRS-RSRP-r16 ::= SEQUENCE {

srs-ResourceId-r16 SRS-ResourceId,

srs-RSRP-Result-r16 SRS-RSRP-Range-r16

}

MeasResultListCLI-RSSI-r16 ::= SEQUENCE (SIZE (1.. maxCLI-Report-r16)) OF MeasResultCLI-RSSI-r16

MeasResultCLI-RSSI-r16 ::= SEQUENCE {

rssi-ResourceId-r16 RSSI-ResourceId-r16,

cli-RSSI-Result-r16 CLI-RSSI-Range-r16

}

UL-PDCP-DelayValueResultList-r16 ::= SEQUENCE (SIZE (1..maxDRB)) OF UL-PDCP-DelayValueResult-r16

UL-PDCP-DelayValueResult-r16 ::= SEQUENCE {

drb-Id-r16 DRB-Identity,

averageDelay-r16 INTEGER (0..10000),

...

}

UL-PDCP-ExcessDelayResultList-r17 ::= SEQUENCE (SIZE (1..maxDRB)) OF UL-PDCP-ExcessDelayResult-r17

UL-PDCP-ExcessDelayResult-r17 ::= SEQUENCE {

drb-Id-r17 DRB-Identity,

excessDelay-r17 INTEGER (0..31),

...

}

TimeBetweenEvent-r17 ::= INTEGER (0..1023)

-- TAG-MEASRESULTS-STOP

-- ASN1STOP

|  |
| --- |
| ***MeasResultEUTRA* field descriptions** |
| ***eutra-PhysCellId***  Identifies the physical cell identity of the E-UTRA cell for which the reporting is being performed. The UE reports a value in the range 0..503, other values are reserved. |

|  |
| --- |
| ***MeasResultNR* field descriptions** |
| ***averageDelay***  Indicates average delay for the packets during the reporting period, as specified in TS 38.314 [53]. Value 0 corresponds to 0 millisecond, value 1 corresponds to 0.1 millisecond, value 2 corresponds to 0.2 millisecond, and so on. |
| ***cellResults***  Cell level measurement results. |
| ***choCandidate***  This field indicates whether the associated cell is a candidate target cell for conditional handover. This field may be included only in the *SuccessHO-Report* within *UEInformationResponse* message. |
| ***choConfig***  If the associated cell is a candidate target cell for conditional handover, this field indicates the conditional handover execution condition for each *measId* within *condTriggerConfig* associated to the cell. This field may be included only in the *rlf-report* within *UEInformationResponse* message. |
| ***drb-Id***  Indicates DRB value for which uplink PDCP delay ratio or value is provided, according to TS 38.314 [53]. |
| ***firstTriggeredEvent***  This field is set to *condFirstEvent* if the execution condition associated to the first entry of *choConfig* was fulfilled first in time. This field is set to *condSecondEvent* if the execution condition associated to the second entry of *choConfig* was fulfilled first in time. This field may be included only in *rlf-report* within *UEInformationResponse* message. |
| ***locationInfo***  Positioning related information and measurements. |
| ***physCellId***  The physical cell identity of the NR cell for which the reporting is being performed. |
| ***resultsSSB-Cell***  Cell level measurement results based on SS/PBCH related measurements. |
| ***resultsSSB-Indexes***  Beam level measurement results based on SS/PBCH related measurements. |
| ***resultsCSI-RS-Cell***  Cell level measurement results based on CSI-RS related measurements. |
| ***resultsCSI-RS-Indexes***  Beam level measurement results based on CSI-RS related measurements. |
| ***rsIndexResults***  Beam level measurement results. |
| ***timeBetweenEvents***  Indicates the time elapsed between fulfilling the conditional execution conditions included in *choConfig*. Value in milliseconds. The maximum value 1023 means 1023ms or longer. This field may be included only in the reports associated to *UEInformationResponse* message, e.g., *rlf-Report*. |

|  |
| --- |
| ***MeasResultUTRA-FDD* field descriptions** |
| ***physCellId***  The physical cell identity of the UTRA-FDD cell for which the reporting is being performed. |
| ***utra-FDD-EcN0***  According to CPICH\_Ec/No in TS 25.133 [46] for FDD. |
| ***utra-FDD-RSCP***  According to CPICH\_RSCP in TS 25.133 [46] for FDD. |

| ***MeasResults* field descriptions** |
| --- |
| ***coarseLocationInfo***  Parameter type *Ellipsoid-Point* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit. The least significant bits of *degreesLatitude* and *degreesLongitude* are set to 0 to meet the accuracy requirement corresponds to a granularity of approximately 2 km.  It is up to UE implementation how many LSBs are set to 0 to meet the accuracy requirement |
| ***excessDelay***  Indicates the ratio of packets in UL per DRB exceeding the configured delay threshold among the UL PDCP SDUs, according to the UL PDCP Excess Packet Delay per DRB mapping table, as defined in TS 38.314 [53], Table 4.3.1.e-1. |
| ***measId***  Identifies the measurement identity for which the reporting is being performed. |
| ***measQuantityResults***  The value sinr is not included when it is used for *LogMeasReport-r16*. |
| ***measResultCellListSFTD-NR***  SFTD measurement results between the PCell and the NR neighbour cell(s) in NR standalone. |
| ***measResultCLI***  CLI measurement results. |
| ***measResultEUTRA***  Measured results of an E-UTRA cell. |
| ***measResultForRSSI***  Includes measured RSSI result in dBm (see TS 38.215 [9]) and *channelOccupancy* which is the percentage of samples when the RSSI was above the configured *channelOccupancyThreshold* for the associated *reportConfig*. |
| ***measResultListEUTRA***  List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity. |
| ***measResultListNR***  List of measured results for the maximum number of reported best cells for an NR measurement identity. |
| ***measResultListUTRA-FDD***  List of measured results for the maximum number of reported best cells for a UTRA-FDD measurement identity. |
| ***measResultNR***  Measured results of an NR cell. |
| ***measResultServFreqListEUTRA-SCG***  Measured results of the E-UTRA SCG serving frequencies: the measurement result of PSCell and each SCell, if any, and of the best neighbouring cell on each E-UTRA SCG serving frequency. |
| ***measResultServFreqListNR-SCG***  Measured results of the NR SCG serving frequencies: the measurement result of PSCell and each SCell, if any, and of the best neighbouring cell on each NR SCG serving frequency. |
| ***measResultServingMOList***  Measured results of measured cells with reference signals indicated in the serving cell measurement objects including measurement results of SpCell, configured SCell(s) and best neighbouring cell within measured cells with reference signals indicated in on each serving cell measurement object. If the sending of the *MeasurementReport* message is triggered by a measurement configured by the field *sl-ConfigDedicatedForNR* received within an E-UTRA *RRCConnectionReconfiguration* message (i.e. CBR measurements), this field is not applicable and its contents is ignored by the network. |
| ***measResultSFTD-EUTRA***  SFTD measurement results between the PCell and the E-UTRA PScell in NE-DC. |
| ***measResultSFTD-NR***  SFTD measurement results between the PCell and the NR PScell in NR-DC. |
| ***measResultsSL***  CBR measurements results for NR sidelink communication/discovery. |
| ***measResultUTRA-FDD***  Measured result of a UTRA-FDD cell. |
| ***sl-MeasResultsCandRelay***  Measurement result(s) of candiate L2 U2N relay UE(s). |
| ***sl-MeasResultsServingRelay***  Measurement result of serving L2 U2N relay UE. |

– *MeasResultsSL*

The IE *MeasResultsSL* covers measured results for NR sidelink communication/discovery.

***MeasResultsSL* information element**

-- ASN1START

-- TAG-MEASRESULTSSL-START

MeasResultsSL-r16 ::= SEQUENCE {

measResultsListSL-r16 CHOICE {

measResultNR-SL-r16 MeasResultNR-SL-r16,

...

},

...

}

MeasResultNR-SL-r16 ::= SEQUENCE {

measResultListCBR-NR-r16 SEQUENCE (SIZE (1.. maxNrofSL-PoolToMeasureNR-r16)) OF MeasResultCBR-NR-r16,

...

}

MeasResultCBR-NR-r16 ::= SEQUENCE {

sl-poolReportIdentity-r16 SL-ResourcePoolID-r16,

sl-CBR-ResultsNR-r16 SL-CBR-r16,

...

}

-- TAG-MEASRESULTSSL-STOP

-- ASN1STOP

| ***MeasResultsSL* field descriptions** |
| --- |
| ***measResultNR-SL***  Include the measured results for NR sidelink communication/discovery. |

|  |
| --- |
| ***MeasResultNR-SL* field descriptions** |
| ***measResultListCBR-NR***  CBR measurement results for NR sidelink communication/discovery. |
| ***sl-poolReportIdentity***  The identity of the transmission resource pool which is corresponding to the *sl-ResourcePoolID* configured in a resource pool for NR sidelink communication/discovery. |

|  |
| --- |
| NEXT CHANGE |

– *ServingCellConfigCommon*

The IE *ServingCellConfigCommon* is used to configure cell specific parameters of a UE's serving cell. The IE contains parameters which a UE would typically acquire from SSB, MIB or SIBs when accessing the cell from IDLE. With this IE, the network provides this information in dedicated signalling when configuring a UE with a SCells or with an additional cell group (SCG). It also provides it for SpCells (MCG and SCG) upon reconfiguration with sync.

***ServingCellConfigCommon* information element**

-- ASN1START

-- TAG-SERVINGCELLCONFIGCOMMON-START

ServingCellConfigCommon ::= SEQUENCE {

physCellId PhysCellId OPTIONAL, -- Cond HOAndServCellAdd,

downlinkConfigCommon DownlinkConfigCommon OPTIONAL, -- Cond HOAndServCellAdd

uplinkConfigCommon UplinkConfigCommon OPTIONAL, -- Need M

supplementaryUplinkConfig UplinkConfigCommon OPTIONAL, -- Need S

n-TimingAdvanceOffset ENUMERATED { n0, n25600, n39936 } OPTIONAL, -- Need S

ssb-PositionsInBurst CHOICE {

shortBitmap BIT STRING (SIZE (4)),

mediumBitmap BIT STRING (SIZE (8)),

longBitmap BIT STRING (SIZE (64))

} OPTIONAL, -- Cond AbsFreqSSB

ssb-periodicityServingCell ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 } OPTIONAL, -- Need S

dmrs-TypeA-Position ENUMERATED {pos2, pos3},

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

ssbSubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond HOAndServCellWithSSB

tdd-UL-DL-ConfigurationCommon TDD-UL-DL-ConfigCommon OPTIONAL, -- Cond TDD

ss-PBCH-BlockPower INTEGER (-60..50),

...,

[[

channelAccessMode-r16 CHOICE {

dynamic NULL,

semiStatic SemiStaticChannelAccessConfig-r16

} OPTIONAL, -- Cond SharedSpectrum

discoveryBurstWindowLength-r16 ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5} OPTIONAL, -- Need R

ssb-PositionQCL-r16 SSB-PositionQCL-Relation-r16 OPTIONAL, -- Cond SharedSpectrum

highSpeedConfig-r16 HighSpeedConfig-r16 OPTIONAL -- Need R

]],

[[

highSpeedConfig-v1700 HighSpeedConfig-v1700 OPTIONAL, -- Need R

channelAccessMode2-r17 ENUMERATED {enabled} OPTIONAL, -- Cond SharedSpectrum2

discoveryBurstWindowLength-r17 ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot75, ms1, ms1dot25} OPTIONAL, -- Need R

ssb-PositionQCL-r17 SSB-PositionQCL-Relation-r17 OPTIONAL, -- Cond SharedSpectrum2

highSpeedConfigFR2-r17 HighSpeedConfigFR2-r17 OPTIONAL, -- Need R

uplinkConfigCommon-v1700 UplinkConfigCommon-v1700 OPTIONAL, -- Need R

ntn-Config-r17 NTN-Config-r17 OPTIONAL -- Need R

]]

}

-- TAG-SERVINGCELLCONFIGCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| ***ServingCellConfigCommon* field descriptions** |
| ***channelAccessMode***  If present, this field indicates which channel access procedures to apply for operation with shared spectrum channel access as defined in TS 37.213 [48]. If the field is configured as "semiStatic", the UE shall apply the channel access procedures for semi-static channel occupancy as described in clause 4.3 in TS 37.213. If the field is configured as "dynamic", the UE shall apply the channel access procedures in TS 37.213, with the exception of clause 4.3 of TS 37.213. |
| ***channelAccessMode2***  If present ('enabled'), the UE shall apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE shall not apply any channel access procedure. |
| ***dmrs-TypeA-Position***  Position of (first) DM-RS for downlink (see TS 38.211 [16], clause 7.4.1.1.1) and uplink (TS 38.211 [16], clause 6.4.1.1.3). |
| ***downlinkConfigCommon***  The common downlink configuration of the serving cell, including the frequency information configuration and the initial downlink BWP common configuration. The parameters provided herein should match the parameters configured by MIB and SIB1 (if provided) of the serving cell, with the exception of *controlResourceSetZero* and *searchSpaceZero* which can be configured in *ServingCellConfigCommon* even if MIB indicates that they are absent. |
| ***discoveryBurstWindowLength***  Indicates the window length of the discovery burst in ms (see TS 37.213 [48]). The field *discoveryBurstWindowLength-r17* is applicable to SCS 480 kHz and SCS 960 kHz. |
| ***longBitmap***  Bitmap when maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1. |
| ***lte-CRS-ToMatchAround***  Parameters to determine an LTE CRS pattern that the UE shall rate match around. |
| ***mediumBitmap***  Bitmap when maximum number of SS/PBCH blocks per half frame equals to 8 as defined in TS 38.213 [13], clause 4.1. |
| ***n-TimingAdvanceOffset***  The N\_TA-Offset to be applied for all uplink transmissions on this serving cell. If the field is absent, the UE applies the value defined for the duplex mode and frequency range of this serving cell. See TS 38.133 [14], table 7.1.2-2. |
| ***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 5.1.4.1). If a *RateMatchPattern* with the same *RateMatchPatternId* is configured in both *ServingCellConfig/ServingCellConfigCommon* and in SIB20/MCCH, the entire *RateMatchPattern* configuration shall be the same and they are counted as a single rate match pattern in the total configured rate match patterns as defined in TS 38.214 [19]. |
| ***shortBitmap***  Bitmap when maximum number of SS/PBCH blocks per half frame equals to 4 as defined in TS 38.213 [13], clause 4.1. |
| ***ss-PBCH-BlockPower***  Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7. |
| ***ssb-periodicityServingCell***  The SSB periodicity in ms for the rate matching purpose. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1) |
| ***ssb-PositionQCL***  Indicates the QCL relation between SSB positions for this serving cell as specified in TS 38.213 [13], clause 4.1. |
| ***ssb-PositionsInBurst***  For operation in licensed spectrum, indicates the time domain positions of the transmitted SS-blocks in a half frame with SS/PBCH blocks as defined in TS 38.213 [13], clause 4.1. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not transmitted while value 1 indicates that the corresponding SS/PBCH block is transmitted. The network configures the same pattern in this field as in the corresponding field in ServingCellConfigCommonSIB.  For operation with shared spectrum channel access, the UE assumes that one or more SS/PBCH blocks indicated by *ssb-PositionsInBurst* may be transmitted within the discovery burst transmission window and have candidate SS/PBCH blocks indexes corresponding to SS/PBCH block indexes provided by *ssb-PositionsInBurst* (see TS 38.213 [13], clause 4.1). If the k-th bit of *ssb-PositionsInBurst* is set to 1, the UE assumes that one or more SS/PBCH blocks within the discovery burst transmission window with candidate SS/PBCH block indexes corresponding to SS/PBCH block index equal to k – 1 may be transmitted; if the kt-th bit is set to 0, the UE assumes that the corresponding SS/PBCH block(s) are not transmitted. The k-th bit is set to 0, where k > *ssb-PositionQCL* and the number of actually transmitted SS/PBCH blocks is not larger than the number of 1's in the bitmap. The network configures the same pattern in this field as in the corresponding field in *ServingCellConfigCommonSIB*. For operation with shared spectrum channel access in FR1, only *mediumBitmap* is used, and for FR2-2, *longBitmap* is used. |
| ***ssbSubcarrierSpacing***  Subcarrier spacing of SSB.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |
| ***supplementaryUplinkConfig***  The network configures this field only if *uplinkConfigCommon* is configured. If this field is absent, the UE shall release the *supplementaryUplinkConfig* and the *supplementaryUplink* configured in *ServingCellConfig* of this serving cell, if configured. |
| ***tdd-UL-DL-ConfigurationCommon***  A cell-specific TDD UL/DL configuration, see TS 38.213 [13], clause 11.1. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *AbsFreqSSB* | The field is absent when *absoluteFrequencySSB* in frequencyInfoDL is absent, otherwise the field is mandatory present. |
| *HOAndServCellAdd* | This field is mandatory present upon SpCell change (including path switch between a serving cell and a L2 U2N Relay UE) and upon serving cell (PSCell/SCell) addition. Otherwise, the field is absent. |
| *HOAndServCellWithSSB* | This field is mandatory present upon SpCell change and upon serving cell (SCell with SSB or PSCell) addition. Otherwise, the field is absent. |
| *SharedSpectrum* | This field is mandatory present if this cell operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R. |
| *SharedSpectrum2* | This field is optionally present if this cell operates with shared spectrum channel access in FR2-2. Otherwise, it is absent, Need R. |
| *TDD* | The field is optionally present, Need R, for TDD cells; otherwise it is absent. |

|  |
| --- |
| NEXT CHANGE |

### 6.3.5 Sidelink information elements

*– SL-DRX-Config*

The IE *SL-DRX-Config* is used to configure DRX related parameters for NR sidelink communication/discovery. The SL DRX timers should be calculated in the unit of physical slot.

***SL-DRX-Config information element***

-- ASN1START

-- TAG-SL-DRX-CONFIG-START

SL-DRX-Config-r17 ::= SEQUENCE {

sl-DRX-Config-GC-BC-r17 SL-DRX-Config-GC-BC-r17 OPTIONAL, -- Cond HO

sl-DRX-ConfigUC-ToReleaseList-r17 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIndex-r16 OPTIONAL, -- Need N

sl-DRX-ConfigUC-ToAddModList-r17 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DRX-ConfigUC-Info-r17 OPTIONAL, -- Need N

...

}

SL-DRX-ConfigUC-Info-r17 ::= SEQUENCE {

sl-DestinationIndex-r17 SL-DestinationIndex-r16 OPTIONAL, -- Need N

sl-DRX-ConfigUC-r17 SL-DRX-ConfigUC-r17 OPTIONAL, -- Need N

...

}

-- TAG-SL-DRX-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-DRX-Config* field descriptions** |
| ***sl-DRX-Config-GC-BC***  This field indicates the sidelink DRX configurations for groupcast and broadcast communication, as specified in TS 38.321 [3]. |
| ***sl-DRX-ConfigUC-ToReleaseList***  This field indicates the sidelink DRX configurations for corresponding unicast destinations to remove. |
| ***sl-DRX-ConfigUC-ToAddModList***  This field indicates the sidelink DRX configurations for corresponding unicast destinations to add and/or modify. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *HO* | This field is optionally present, need M, in an *RRCReconfiguration* message including *reconfigurationWithSync*; otherwise it is absent, Need M. |

*– SL-DRX-Config-GC-BC*

The IE *SL-DRX-Config-GC-BC* is used to configure DRX related parameters for NR sidelink groupcast and broadcast communication, unicast/broadcast based communication of Direct Link Establishment Request (TS 24.587 [57]), and discovery message.

***SL-DRX-Config-GC-BC* information element**

-- ASN1START

-- TAG-SL-DRX-CONFIG-GC-BC-START

SL-DRX-Config-GC-BC-r17 ::= SEQUENCE {

sl-DRX-GC-BC-PerQoS-List-r17 SEQUENCE (SIZE (1..maxSL-GC-BC-DRX-QoS-r17)) OF SL-DRX-GC-BC-QoS-r17 OPTIONAL, -- Need M

sl-DRX-GC-generic-r17 SL-DRX-GC-Generic-r17 OPTIONAL, -- Need M

sl-DefaultDRX-GC-BC-r17 SL-DRX-GC-BC-QoS-r17 OPTIONAL, -- Need M

...

}

SL-DRX-GC-BC-QoS-r17 ::= SEQUENCE {

sl-DRX-GC-BC-MappedQoS-FlowList-r17 SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-Profile-r16 OPTIONAL, -- Need M

sl-DRX-GC-BC-OnDurationTimer-r17 CHOICE {

subMilliSeconds INTEGER (1..31),

milliSeconds ENUMERATED {

ms1, ms2, ms3, ms4, ms5,ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,

ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,

ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1}

},

sl-DRX-GC-InactivityTimer-r17 ENUMERATED {

ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,

ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,

spare7, spare6, spare5, spare4, spare3, spare2, spare1},

sl-DRX-GC-BC-Cycle-r17 ENUMERATED {

ms10, ms20, ms32, ms40, ms60, ms64, ms70, ms80, ms128, ms160, ms256, ms320, ms512,

ms640, ms1024, ms1280, ms2048, ms2560, ms5120, ms10240, spare12, spare11, spare10,

spare9, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1},

...

}

SL-DRX-GC-Generic-r17 ::= SEQUENCE {

sl-DRX-GC-HARQ-RTT-Timer1-r17 ENUMERATED {sl0, sl1, sl2, sl4, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M

sl-DRX-GC-HARQ-RTT-Timer2-r17 ENUMERATED {sl0, sl1, sl2, sl4, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M

sl-DRX-GC-RetransmissionTimer-r17 ENUMERATED {

sl0, sl1, sl2, sl4, sl6, sl8, sl16, sl24, sl33, sl40, sl64, sl80, sl96, sl112, sl128,

sl160, sl320, spare15, spare14, spare13, spare12, spare11, spare10, spare9, spare8,

spare7, spare6, spare5, spare4, spare3, spare2, spare1}

}

-- TAG-SL-DRX-CONFIG-GC-BC-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-DRX-Config-GC-BC field descriptions*** |
| ***sl-DefaultDRX-GC-BC-r17***  Indicates the default sidelink DRX configuration for groupcast and broadcast communications, which is used for QoS profile(s) that cannot be mapped into DRX configuration(s) configured for dedicated QoS profile(s). This field can be applied for the broadcast based or unicast based communication of Direct Link Establishment Request as described in TS 24.587 [57] and discovery message.. |
| ***sl-DRX-GC-BC-PerQoS-List***  List of one or multiple sidelink DRX configurations for groupcast and broadcast communication, which are mapped from QoS profile(s). |
| ***sl-DRX-GC-BC-Cycle***  Value in ms, ms10 corresponds to 10ms, ms20 corresponds to 20 ms, ms32 corresponds to 32 ms, and so on. |
| ***sl-DRX-GC-BC-MappedQoS-FlowsList***  List of QoS profiles of the NR sidelink communication, which are mapped to a sidelink DRX configuration. |
| ***sl-DRX-GC-BC-OnDurationTimer***  Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, and so on. |
| ***sl-DRX-GC-HARQ-RTT-Timer1, sl-DRX-GC-HARQ-RTT-Timer2***  Value in number of slot lengths of the BWP where the transport block was received. Value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on. *sl-DRX-GC-HARQ-RTT-Timer1* is used for HARQ enabled sidelink transmission if SCI does not indicate retransmission resource(s). *sl-DRX-GC-HARQ-RTT-Timer2* is used for HARQ disabled sidelink transmission in resource pool configured with PSFCH if SCI does not indicate retransmission resource(s). |
| ***sl-DRX-GC-Generic***  Indicates a sidelink DRX configuration, which is applicable to any QoS profile or any Destination Layer-2 ID. |
| ***sl-DRX-GC-InactivityTimer***  Value in multiple integers of 1 ms, ms0 corresponds to 0, ms1 corresponds to 1 ms, ms2 corresponds to 2 ms, and so on. This field is only valid for groupcast communication. |
| ***sl-DRX-GC-RetransmissionTimer***  Value in number of slot lengths of the BWP where the transport block was received. Value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on. |

|  |
| --- |
| NEXT CHANGE |

– *SL-ServingCellInfo*

The IE *SL-ServingCellInfo* is used to indicate the L2 U2N Relay UE’s PCell/camping cell , which is considered as PCell/camping cell by the L2 U2N Remote UEs connecting with this L2 U2N Relay UE.

***SL-ServingCellInfo* information element**

-- ASN1START

-- TAG-SL-SERVINGCELLINFO-START

SL-ServingCellInfo-r17 ::= SEQUENCE {

sl-PhysCellId-r17 PhysCellId,

sl-CarrierFreqNR-r17 ARFCN-ValueNR

}

-- TAG-SL-SERVINGCELLINFO-STOP

-- ASN1STOP

| ***SL-ServingCellInfo* field descriptions** |
| --- |
| ***sl-CarrierFreqNR***  Indicates the DL frequency of the cell indicated by *sl-PhysCellId*. |
| ***sl-PhysCellId***  Indicates the PCI of the PCell. |

|  |
| --- |
| NEXT CHANGE |

– *SL-SRAP-Config*

The IE SL-*SRAP-Config* is used to set the configurable SRAP parameters used by L2 U2N Relay UE and L2 U2N Remote UE as specified in TS 38.351 [66].

***SL-SRAP-Config* information element**

-- ASN1START

-- TAG-SL-SRAP-CONFIG-START

SL-SRAP-Config-r17 ::= SEQUENCE {

sl-LocalIdentity-r17 INTEGER (0..255) OPTIONAL, -- Need M

sl-MappingToAddModList-r17 SEQUENCE (SIZE (1..maxLC-ID)) OF SL-MappingToAddMod-r17 OPTIONAL, -- Need N

sl-MappingToReleaseList-r17 SEQUENCE (SIZE (1..maxLC-ID)) OF SL-RemoteUE-RB-Identity-r17 OPTIONAL, -- Need N

...

}

SL-MappingToAddMod-r17 ::= SEQUENCE {

sl-RemoteUE-RB-Identity-r17 SL-RemoteUE-RB-Identity-r17,

sl-EgressRLC-ChannelUu-r17 Uu-RelayRLC-ChannelID-r17 OPTIONAL, -- Cond L2RelayUE

sl-EgressRLC-ChannelPC5-r17 SL-RLC-ChannelID-r17 OPTIONAL, -- Need N

...

}

SL-RemoteUE-RB-Identity-r17 ::= CHOICE {

srb-Identity-r17 INTEGER (0..3),

drb-Identity-r17 DRB-Identity,

...

}

-- TAG-SL-SRAP-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-SRAP-Config* field descriptions** |
| ***sl-LocalIdentity***  Indicates the local UE ID of the L2 U2N Remote UE used in SRAP as specified in TS 38.351 [66]. |
| ***sl-MappingToAddModList***  Indicates the list of mapping between the bearer identity of the L2 U2N Remote UE and the egress RLC channel as specified in TS 38.351 [66]. |
| ***sl-MappingToReleaseList***  Indicates the list of mapping to be released. |
| ***sl-RemoteUE-RB-Identity***  Identity of the end-to-end Uu bearer identity of the L2 U2N Remote UE. The value 3 for the field *srb-identity-r17* (i.e., for configuring SRB3) is not supported in this version of the specification. |
| ***sl-EgressRLC-ChannelUu***  Indicates the egress RLC channel on Uu Hop. |
| ***sl-EgressRLC-ChannelPC5***  Indicates the egress RLC channel on PC5 Hop. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *L2RelayUE* | For L2 U2N Relay UE, the field is optionally present, Need M. Otherwise, it is absent. |

|  |
| --- |
| NEXT CHANGE |

## 6.4 RRC multiplicity and type constraint values

### – Multiplicity and type constraint definitions

-- ASN1START

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

ffsUpperLimit INTEGER ::= 9999 -- Introduced only for ASN.1 syntax purposes. Actual upper limit of the

-- ranges using this constant throughout the specification are FFS.

maxAdditionalRACH-r17 INTEGER ::= 256 -- Maximum number of additional RACH configurations.

maxAI-DCI-PayloadSize-r16 INTEGER ::= 128 --Maximum size of the DCI payload scrambled with ai-RNTI

maxAI-DCI-PayloadSize-1-r16 INTEGER ::= 127 --Maximum size of the DCI payload scrambled with ai-RNTI minus 1

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

maxBandsUTRA-FDD-r16 INTEGER ::= 64 -- Maximum number of bands listed in UTRA-FDD UE caps

maxBH-RLC-ChannelID-r16 INTEGER ::= 65536 -- Maximum value of BH RLC Channel ID

maxBT-IdReport-r16 INTEGER ::= 32 -- Maximum number of Bluetooth IDs to report

maxBT-Name-r16 INTEGER ::= 4 -- Maximum number of Bluetooth name

maxCAG-Cell-r16 INTEGER ::= 16 -- Maximum number of NR CAG cell ranges in SIB3, SIB4

maxTwoPUCCH-Grp-ConfigList-r16 INTEGER ::= 32 -- Maximum number of supported configuration(s) of {primary PUCCH group

-- config, secondary PUCCH group config}

maxCBR-Config-r16 INTEGER ::= 8 -- Maximum number of CBR range configurations for sidelink communication

-- congestion control

maxCBR-Config-1-r16 INTEGER ::= 7 -- Maximum number of CBR range configurations for sidelink communication

-- congestion control minus 1

maxCBR-Level-r16 INTEGER ::= 16 -- Maximum number of CBR levels

maxCBR-Level-1-r16 INTEGER ::= 15 -- Maximum number of CBR levels minus 1

maxCellExcluded INTEGER ::= 16 -- Maximum number of NR exclude-listed cell ranges in SIB3, SIB4

maxCellGroupings-r16 INTEGER ::= 32 -- Maximum number of cell groupings for NR-DC

maxCellHistory-r16 INTEGER ::= 16 -- Maximum number of visited PCells reported

maxPSCellHistory-r17 INTEGER ::= 16 -- Maximum number of visited PSCells across all reported PCells

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

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

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

maxCellMeasIdle-r16 INTEGER ::= 8 -- Maximum number of cells per carrier for idle/inactive measurements

maxCellMeasUTRA-FDD-r16 INTEGER ::= 32 -- Maximum number of cells in FDD UTRAN

maxCellNTN-r17 INTEGER ::= 4 -- Maximum number of NTN neighbour cells for which assistance information is

-- provided

maxCarrierTypePairList-r16 INTEGER ::= 16 -- Maximum number of supported carrier type pair of (carrier type on which

-- CSI measurement is performed, carrier type on which CSI reporting is

-- performed) for CSI reporting cross PUCCH group

maxCellAllowed INTEGER ::= 16 -- Maximum number of NR allow-listed cell ranges in SIB3, SIB4

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

maxEUTRA-CellExcluded INTEGER ::= 16 -- Maximum number of E-UTRA exclude-listed physical cell identity ranges

-- in SIB5

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

maxFeatureCombPreamblesPerRACHResource-r17 INTEGER ::= 256 -- Maximum number of feature combination preambles.

maxLogMeasReport-r16 INTEGER ::= 520 -- Maximum number of entries for logged measurements

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

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

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

maxFreqIdle-r16 INTEGER ::= 8 -- Maximum number of carrier frequencies for idle/inactive measurements

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

maxNrofServingCells-1 INTEGER ::= 31 -- Max number of serving cells (SpCells + SCells) minus 1

maxNrofAggregatedCellsPerCellGroup INTEGER ::= 16

maxNrofAggregatedCellsPerCellGroupMinus4-r16 INTEGER ::= 12

maxNrofDUCells-r16 INTEGER ::= 512 -- Max number of cells configured on the collocated IAB-DU

maxNrofAppLayerMeas-r17 INTEGER ::= 16 -- Max number of simultaneous application layer measurements

maxNrofAppLayerMeas-1-r17 INTEGER ::= 15 -- Max number of simultaneous application layer measurements\_minus 1

maxNrofAvailabilityCombinationsPerSet-r16 INTEGER ::= 512 -- Max number of AvailabilityCombinationId used in the DCI format 2\_5

maxNrofAvailabilityCombinationsPerSet-1-r16 INTEGER ::= 511 -- Max number of AvailabilityCombinationId used in the DCI format 2\_5 minus 1

maxNrofIABResourceConfig-r17 INTEGER ::= 65536 -- Max number of IAB-ResourceConfigID used in MAC CE

maxNrofIABResourceConfig-1-r17 INTEGER ::= 65535 -- Max number of IAB-ResourceConfigID used in MAC CE minus 1

maxNrofSCellActRS-r17 INTEGER ::= 255 -- Max number of RS configurations per SCell for SCell activation

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

maxNrofCRS-IM-InterfCell-r17 INTEGER ::= 8 -- Maximum number of LTE interference cells for CRS-IM per UE

maxNrofRelayMeas-r17 INTEGER ::= 32 -- Maximum number of L2 U2N Relay UEs to measure for each measurement object

-- on sidelink frequency

maxNrofCG-SL-r16 INTEGER ::= 8 -- Max number of sidelink configured grant

maxNrofCG-SL-1-r16 INTEGER ::= 7 -- Max number of sidelink configured grant minus 1

maxSL-GC-BC-DRX-QoS-r17 INTEGER ::= 16 -- Max number of sidelink DRX configurations for NR

-- sidelink groupcast/broadcast communication

maxNrofSL-RxInfoSet-r17 INTEGER ::= 4 -- Max number of sidelink DRX configuration sets in sidelink DRX assistant

-- information

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

maxNrofCondCells-r16 INTEGER ::= 8 -- Max number of conditional candidate SpCells

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

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

maxNrofPDU-Sessions-r17 INTEGER ::= 256 -- Maximum number of PDU Sessions

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

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

maxLCG-ID-IAB-r17 INTEGER ::= 255 -- Maximum value of LCG ID for IAB-MT

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

maxLC-ID-Iab-r16 INTEGER ::= 65855 -- Maximum value of BH Logical Channel ID extension

maxLTE-CRS-Patterns-r16 INTEGER ::= 3 -- Maximum number of additional LTE CRS rate matching patterns

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

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

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

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

maxNrofSymbols-1 INTEGER ::= 13 -- Maximum index identifying a symbol within a slot (14 symbols, indexed from 0..13)

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

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

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

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

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

maxNrofControlResourceSets INTEGER ::= 12 -- Max number of CoReSets configurable on a serving cell

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

maxNrofControlResourceSets-1-r16 INTEGER ::= 15 -- Max number of CoReSets configurable on a serving cell extended in minus 1

maxNrofCoresetPools-r16 INTEGER ::= 2 -- Maximum number of CORESET pools

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

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

maxNrofSearchSpacesLinks-1-r17 INTEGER ::= ffsUpperLimit -- Max number of Search Space links minus 1 FFS on actual size

maxNrofBFDResourcePerSet-r17 INTEGER ::= 64 -- Max number of refernce signal in one BFD set

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

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

maxIAB-IP-Address-r16 INTEGER ::= 32 -- Max number of assigned IP addresses

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

maxNrofCSI-IM-Resources INTEGER ::= 32 -- Maximum number of CSI-IM resources

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

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

maxNrofCSI-IM-ResourceSets INTEGER ::= 64 -- Maximum number of NZP CSI-IM resource sets per cell

maxNrofCSI-IM-ResourceSets-1 INTEGER ::= 63 -- Maximum number of NZP CSI-IM resource sets per cell minus 1

maxNrofCSI-IM-ResourceSetsPerConfig INTEGER ::= 16 -- Maximum number of CSI IM resource sets per resource configuration

maxNrofCSI-SSB-ResourcePerSet INTEGER ::= 64 -- Maximum number of SSB resources in a resource set

maxNrofCSI-SSB-ResourceSets INTEGER ::= 64 -- Maximum number of CSI SSB resource sets per cell

maxNrofCSI-SSB-ResourceSets-1 INTEGER ::= 63 -- Maximum number of CSI SSB resource sets per cell minus 1

maxNrofCSI-SSB-ResourceSetsPerConfig INTEGER ::= 1 -- Maximum number of CSI SSB resource sets per resource configuration

maxNrofCSI-SSB-ResourceSetsPerConfigExt INTEGER ::= 2 -- Maximum number of CSI SSB resource sets per resource configuration

-- extended

maxNrofFailureDetectionResources INTEGER ::= 10 -- Maximum number of failure detection resources

maxNrofFailureDetectionResources-1 INTEGER ::= 9 -- Maximum number of failure detection resources minus 1

maxNrofFailureDetectionResources-1-r17 INTEGER ::= 63 -- Maximum number of the enhanced failure detection resources minus 1

maxNrofFreqSL-r16 INTEGER ::= 8 -- Maximum number of carrier frequency for NR sidelink communication

maxNrofSL-BWPs-r16 INTEGER ::= 4 -- Maximum number of BWP for NR sidelink communication

maxFreqSL-EUTRA-r16 INTEGER ::= 8 -- Maximum number of EUTRA anchor carrier frequency for NR sidelink communication

maxNrofSL-MeasId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement identity (RSRP) per destination

maxNrofSL-ObjectId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement objects (RSRP) per destination

maxNrofSL-ReportConfigId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement reporting configuration(RSRP) per destination

maxNrofSL-PoolToMeasureNR-r16 INTEGER ::= 8 -- Maximum number of resource pool for NR sidelink measurement to measure for

-- each measurement object (for CBR)

maxFreqSL-NR-r16 INTEGER ::= 8 -- Maximum number of NR anchor carrier frequency for NR sidelink communication

maxNrofSL-QFIs-r16 INTEGER ::= 2048 -- Maximum number of QoS flow for NR sidelink communication per UE

maxNrofSL-QFIsPerDest-r16 INTEGER ::= 64 -- Maximum number of QoS flow per destination for NR sidelink communication

maxNrofObjectId INTEGER ::= 64 -- Maximum number of measurement objects

maxNrofPageRec INTEGER ::= 32 -- Maximum number of page records

maxNrofPCI-Ranges INTEGER ::= 8 -- Maximum number of PCI ranges

maxPLMN INTEGER ::= 12 -- Maximum number of PLMNs broadcast and reported by UE at establishment

maxTAC-r17 INTEGER ::= 12 -- Maximum number of Tracking Area Codes to which a cell belongs to

maxNrofCSI-RS-ResourcesRRM INTEGER ::= 96 -- Maximum number of CSI-RS resources per cell for an RRM measurement object

maxNrofCSI-RS-ResourcesRRM-1 INTEGER ::= 95 -- Maximum number of CSI-RS resources per cell for an RRM measurement object

-- minus 1.

maxNrofMeasId INTEGER ::= 64 -- Maximum number of configured measurements

maxNrofQuantityConfig INTEGER ::= 2 -- Maximum number of quantity configurations

maxNrofCSI-RS-CellsRRM INTEGER ::= 96 -- Maximum number of cells with CSI-RS resources for an RRM measurement object

maxNrofSL-Dest-r16 INTEGER ::= 32 -- Maximum number of destination for NR sidelink communication and discovery

maxNrofSL-Dest-1-r16 INTEGER ::= 31 -- Highest index of destination for NR sidelink communication and discovery

maxNrofSLRB-r16 INTEGER ::= 512 -- Maximum number of radio bearer for NR sidelink communication per UE

maxSL-LCID-r16 INTEGER ::= 512 -- Maximum number of RLC bearer for NR sidelink communication per UE

maxSL-SyncConfig-r16 INTEGER ::= 16 -- Maximum number of sidelink Sync configurations

maxNrofRXPool-r16 INTEGER ::= 16 -- Maximum number of Rx resource pool for NR sidelink communication and

-- discovery

maxNrofTXPool-r16 INTEGER ::= 8 -- Maximum number of Tx resource pool for NR sidelink communication and

-- discovery

maxNrofPoolID-r16 INTEGER ::= 16 -- Maximum index of resource pool for NR sidelink communication and

-- discovery

maxNrofSRS-PathlossReferenceRS-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for SRS power control.

maxNrofSRS-PathlossReferenceRS-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for SRS power control

-- minus 1.

maxNrofSRS-ResourceSets INTEGER ::= 16 -- Maximum number of SRS resource sets in a BWP.

maxNrofSRS-ResourceSets-1 INTEGER ::= 15 -- Maximum number of SRS resource sets in a BWP minus 1.

maxNrofSRS-PosResourceSets-r16 INTEGER ::= 16 -- Maximum number of SRS Positioning resource sets in a BWP.

maxNrofSRS-PosResourceSets-1-r16 INTEGER ::= 15 -- Maximum number of SRS Positioning resource sets in a BWP minus 1.

maxNrofSRS-Resources INTEGER ::= 64 -- Maximum number of SRS resources.

maxNrofSRS-Resources-1 INTEGER ::= 63 -- Maximum number of SRS resources minus 1.

maxNrofSRS-PosResources-r16 INTEGER ::= 64 -- Maximum number of SRS Positioning resources.

maxNrofSRS-PosResources-1-r16 INTEGER ::= 63 -- Maximum number of SRS Positioning resources minus 1.

maxNrofSRS-ResourcesPerSet INTEGER ::= 16 -- Maximum number of SRS resources in an SRS resource set

maxNrofSRS-TriggerStates-1 INTEGER ::= 3 -- Maximum number of SRS trigger states minus 1, i.e., the largest code point.

maxNrofSRS-TriggerStates-2 INTEGER ::= 2 -- Maximum number of SRS trigger states minus 2.

maxRAT-CapabilityContainers INTEGER ::= 8 -- Maximum number of interworking RAT containers (incl NR and MRDC)

maxSimultaneousBands INTEGER ::= 32 -- Maximum number of simultaneously aggregated bands

maxULTxSwitchingBandPairs INTEGER ::= 32 -- Maximum number of band pairs supporting dynamic UL Tx switching in a band

-- combination.

maxNrofSlotFormatCombinationsPerSet INTEGER ::= 512 -- Maximum number of Slot Format Combinations in a SF-Set.

maxNrofSlotFormatCombinationsPerSet-1 INTEGER ::= 511 -- Maximum number of Slot Format Combinations in a SF-Set minus 1.

maxNrofTrafficPattern-r16 INTEGER ::= 8 -- Maximum number of Traffic Pattern for NR sidelink communication.

maxNrofPUCCH-Resources INTEGER ::= 128

maxNrofPUCCH-Resources-1 INTEGER ::= 127

maxNrofPUCCH-ResourceSets INTEGER ::= 4 -- Maximum number of PUCCH Resource Sets

maxNrofPUCCH-ResourceSets-1 INTEGER ::= 3 -- Maximum number of PUCCH Resource Sets minus 1.

maxNrofPUCCH-ResourcesPerSet INTEGER ::= 32 -- Maximum number of PUCCH Resources per PUCCH-ResourceSet

maxNrofPUCCH-P0-PerSet INTEGER ::= 8 -- Maximum number of P0-pucch present in a p0-pucch set

maxNrofPUCCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUCCH power control.

maxNrofPUCCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUCCH power control

-- minus 1.

maxNrofPUCCH-PathlossReferenceRSs-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for PUCCH power control

-- extended.

maxNrofPUCCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for PUCCH power control

-- minus 1 extended.

maxNrofPUCCH-PathlossReferenceRSs-1-r17 INTEGER ::= 7 -- Maximum number of RSs used as pathloss reference for PUCCH power control

-- minus 1.

maxNrofPUCCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60 -- Difference between the extended maximum and the non-extended maximum

maxNrofPUCCH-ResourceGroups-r16 INTEGER ::= 4 -- Maximum number of PUCCH resources groups.

maxNrofPUCCH-ResourcesPerGroup-r16 INTEGER ::= 128 -- Maximum number of PUCCH resources in a PUCCH group.

maxNrofPowerControlSetInfos-r17 INTEGER ::= 8 -- Maximum number of PUCCH power control set infos

maxNrofMultiplePUSCHs-r16 INTEGER ::= 8 -- Maximum number of multiple PUSCHs in PUSCH TDRA list

maxNrofP0-PUSCH-AlphaSets INTEGER ::= 30 -- Maximum number of P0-pusch-alpha-sets (see TS 38.213 [13], clause 7.1)

maxNrofP0-PUSCH-AlphaSets-1 INTEGER ::= 29 -- Maximum number of P0-pusch-alpha-sets minus 1 (see TS 38.213 [13], clause 7.1)

maxNrofPUSCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUSCH power control.

maxNrofPUSCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUSCH power control

-- minus 1.

maxNrofPUSCH-PathlossReferenceRSs-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for PUSCH power control

-- extended

maxNrofPUSCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for PUSCH power control

-- extended minus 1

maxNrofPUSCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60 -- Difference between maxNrofPUSCH-PathlossReferenceRSs-r16 and

-- maxNrofPUSCH-PathlossReferenceRSs

maxNrofNAICS-Entries INTEGER ::= 8 -- Maximum number of supported NAICS capability set

maxBands INTEGER ::= 1024 -- Maximum number of supported bands in UE capability.

maxBandsMRDC INTEGER ::= 1280

maxBandsEUTRA INTEGER ::= 256

maxCellReport INTEGER ::= 8

maxDRB INTEGER ::= 29 -- Maximum number of DRBs (that can be added in DRB-ToAddModList).

maxFreq INTEGER ::= 8 -- Max number of frequencies.

maxFreqLayers INTEGER ::= 4 -- Max number of frequency layers.

maxFreqPlus1 INTEGER ::= 9 -- Max number of frequencies for Slicing.

maxFreqIDC-r16 INTEGER ::= 128 -- Max number of frequencies for IDC indication.

maxCombIDC-r16 INTEGER ::= 128 -- Max number of reported UL CA for IDC indication.

maxFreqIDC-MRDC INTEGER ::= 32 -- Maximum number of candidate NR frequencies for MR-DC IDC indication

maxNrofCandidateBeams INTEGER ::= 16 -- Max number of PRACH-ResourceDedicatedBFR in BFR config.

maxNrofCandidateBeams-r16 INTEGER ::= 64 -- Max number of candidate beam resources in BFR config.

maxNrofCandidateBeamsExt-r16 INTEGER ::= 48 -- Max number of PRACH-ResourceDedicatedBFR in the CandidateBeamRSListExt

maxNrofPCIsPerSMTC INTEGER ::= 64 -- Maximum number of PCIs per SMTC.

maxNrofQFIs INTEGER ::= 64

maxNrofResourceAvailabilityPerCombination-r16 INTEGER ::= 256

maxNrOfSemiPersistentPUSCH-Triggers INTEGER ::= 64 -- Maximum number of triggers for semi persistent reporting on PUSCH

maxNrofSR-Resources INTEGER ::= 8 -- Maximum number of SR resources per BWP in a cell.

maxNrofSlotFormatsPerCombination INTEGER ::= 256

maxNrofSpatialRelationInfos INTEGER ::= 8

maxNrofSpatialRelationInfos-plus-1 INTEGER ::= 9

maxNrofSpatialRelationInfos-r16 INTEGER ::= 64

maxNrofSpatialRelationInfosDiff-r16 INTEGER ::= 56 -- Difference between maxNrofSpatialRelationInfos-r16 and maxNrofSpatialRelationInfos

maxNrofIndexesToReport INTEGER ::= 32

maxNrofIndexesToReport2 INTEGER ::= 64

maxNrofSSBs-r16 INTEGER ::= 64 -- Maximum number of SSB resources in a resource set.

maxNrofSSBs-1 INTEGER ::= 63 -- Maximum number of SSB resources in a resource set minus 1.

maxNrofS-NSSAI INTEGER ::= 8 -- Maximum number of S-NSSAI.

maxNrofTCI-StatesPDCCH INTEGER ::= 64

maxNrofTCI-States INTEGER ::= 128 -- Maximum number of TCI states.

maxNrofTCI-States-1 INTEGER ::= 127 -- Maximum number of TCI states minus 1.

maxUL-TCI-r17 INTEGER ::= 64 -- Maximum number of TCI states.

maxUL-TCI-1-r17 INTEGER ::= 63 -- Maximum number of TCI states minus 1.

maxNrofAdditionalPCI-r17 INTEGER ::= 7 -- Maximum number of additional PCI

maxMPE-Resources-r17 INTEGER ::= 64 -- Maximum number of pooled MPE resources

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 supported by the UE

maxNrofCSI-RS-ResourcesExt-r16 INTEGER ::= 16 -- Maximum number of codebook resources supported by the UE for eType2/Codebook combo

maxNrofCSI-RS-ResourcesExt-r17 INTEGER ::= 8 -- Maximum number of codebook resources for fetype2Rank1 and fetype2Rank2

maxNrofCSI-RS-Resources INTEGER ::= 7 -- Maximum number of codebook resources supported by the UE

maxNrofCSI-RS-ResourcesAlt-r16 INTEGER ::= 512 -- Maximum number of alternative codebook resources supported by the UE

maxNrofCSI-RS-ResourcesAlt-1-r16 INTEGER ::= 511 -- Maximum number of alternative codebook resources supported by the UE minus 1

maxNrofSRI-PUSCH-Mappings INTEGER ::= 16

maxNrofSRI-PUSCH-Mappings-1 INTEGER ::= 15

maxSIB INTEGER::= 32 -- Maximum number of SIBs

maxSI-Message INTEGER::= 32 -- Maximum number of SI messages

maxSIB-MessagePlus1-r17 INTEGER::= 33 -- Maximum number of SIB messages plus 1

maxPO-perPF INTEGER ::= 4 -- Maximum number of paging occasion per paging frame

maxPEI-perPF-r17 INTEGER ::= 4 -- Maximum number of PEI occasion per paging frame

maxAccessCat-1 INTEGER ::= 63 -- Maximum number of Access Categories minus 1

maxBarringInfoSet INTEGER ::= 8 -- Maximum number of access control parameter sets

maxCellEUTRA INTEGER ::= 8 -- Maximum number of E-UTRA cells in SIB list

maxEUTRA-Carrier INTEGER ::= 8 -- Maximum number of E-UTRA carriers in SIB list

maxPLMNIdentities INTEGER ::= 8 -- Maximum number of PLMN identities 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

maxGIN-r17 INTEGER ::= 24 -- Maximum number of broadcast GINs

maxHRNN-Len-r16 INTEGER ::= 48 -- Maximum length of HRNNs

maxNPN-r16 INTEGER ::= 12 -- Maximum number of NPNs broadcast and reported by UE at establishment

maxNrOfMinSchedulingOffsetValues-r16 INTEGER ::= 2 -- Maximum number of min. scheduling offset (K0/K2) configurations

maxK0-SchedulingOffset-r16 INTEGER ::= 16 -- Maximum number of slots configured as min. scheduling offset (K0)

maxK2-SchedulingOffset-r16 INTEGER ::= 16 -- Maximum number of slots configured as min. scheduling offset (K2)

maxK0-SchedulingOffset-r17 INTEGER ::= 64 -- Maximum number of slots configured as min. scheduling offset (K0)

maxK2-SchedulingOffset-r17 INTEGER ::= 64 -- Maximum number of slots configured as min. scheduling offset (K2)

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

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

maxDCI-2-6-Size-1-r16 INTEGER ::= 139 -- Maximum DCI format 2-6 size minus 1

maxNrofUL-Allocations-r16 INTEGER ::= 64 -- Maximum number of PUSCH time domain resource allocations

maxNrofP0-PUSCH-Set-r16 INTEGER ::= 2 -- Maximum number of P0 PUSCH set(s)

maxOnDemandSIB-r16 INTEGER ::= 8 -- Maximum number of SIB(s) that can be requested on-demand

maxOnDemandPosSIB-r16 INTEGER ::= 32 -- Maximum number of posSIB(s) that can be requested on-demand

maxCI-DCI-PayloadSize-r16 INTEGER ::= 126 -- Maximum number of the DCI size for CI

maxCI-DCI-PayloadSize-1-r16 INTEGER ::= 125 -- Maximum number of the DCI size for CI minus 1

maxUu-RelayRLC-ChannelID-r17 INTEGER ::= 32 -- Maximum value of Uu Relay RLC channel ID

maxWLAN-Id-Report-r16 INTEGER ::= 32 -- Maximum number of WLAN IDs to report

maxWLAN-Name-r16 INTEGER ::= 4 -- Maximum number of WLAN name

maxRAReport-r16 INTEGER ::= 8 -- Maximum number of RA procedures information to be included in the RA report

maxTxConfig-r16 INTEGER ::= 64 -- Maximum number of sidelink transmission parameters configurations

maxTxConfig-1-r16 INTEGER ::= 63 -- Maximum number of sidelink transmission parameters configurations minus 1

maxPSSCH-TxConfig-r16 INTEGER ::= 16 -- Maximum number of PSSCH TX configurations

maxNrofCLI-RSSI-Resources-r16 INTEGER ::= 64 -- Maximum number of CLI-RSSI resources for UE

maxNrofCLI-RSSI-Resources-1-r16 INTEGER ::= 63 -- Maximum number of CLI-RSSI resources for UE minus 1

maxNrofCLI-SRS-Resources-r16 INTEGER ::= 32 -- Maximum number of SRS resources for CLI measurement for UE

maxCLI-Report-r16 INTEGER ::= 8

maxNrofConfiguredGrantConfig-r16 INTEGER ::= 12 -- Maximum number of configured grant configurations per BWP

maxNrofConfiguredGrantConfig-1-r16 INTEGER ::= 11 -- Maximum number of configured grant configurations per BWP minus 1

maxNrofCG-Type2DeactivationState INTEGER ::= 16 -- Maximum number of deactivation state for type 2 configured grants per BWP

maxNrofConfiguredGrantConfigMAC-1-r16 INTEGER ::= 31 -- Maximum number of configured grant configurations per MAC entity minus 1

maxNrofSPS-Config-r16 INTEGER ::= 8 -- Maximum number of SPS configurations per BWP

maxNrofSPS-Config-1-r16 INTEGER ::= 7 -- Maximum number of SPS configurations per BWP minus 1

maxNrofSPS-DeactivationState INTEGER ::= 16 -- Maximum number of deactivation state for SPS per BWP

maxNrofPPW-Config-r17 INTEGER ::= 4 -- Maximum number of activated PRS processing windows across all active DL

-- BWPs

maxNrofPPW-ID-1-r17 INTEGER ::= 15 -- Maximum number of Preconfigured PRS processing windows minus 1

maxNrOfTxTEGReport-r17 INTEGER ::= 256 -- Maximum number of UE Tx Timing Error Group Report

maxNrOfTxTEG-ID-1-r17 INTEGER ::= 7 -- Maximum number of UE Tx Timing Error Group ID minus 1

maxNrofDormancyGroups INTEGER ::= 5 --

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

maxNrofPUCCH-ResourceGroups-1-r16 INTEGER ::= 3 --

maxNrofServingCellsTCI-r16 INTEGER ::= 32 -- Maximum number of serving cells in simultaneousTCI-UpdateList

maxNrofTxDC-TwoCarrier-r16 INTEGER ::= 64 -- Maximum number of UL Tx DC locations reported by the UE for 2CC uplink CA

maxNrofRB-SetGroups-r17 INTEGER ::= 8 -- Maximum number of RB set groups

maxNrofRB-Sets-r17 INTEGER ::= 8 -- Maximum number of RB sets

maxNrofEnhType3HARQ-ACK-r17 INTEGER ::= 8 -- Maximum number of enhanced type 3 HARQ-ACK codebook

maxNrofEnhType3HARQ-ACK-1-r17 INTEGER ::= 7 -- Maximum number of enhanced type 3 HARQ-ACK codebook minus 1

maxNrofPRS-ResourcesPerSet-r17 INTEGER ::= 64 -- Maximum number of PRS resources for one set

maxNrofPRS-ResourcesPerSet-1-r17 INTEGER ::= 63 -- Maximum number of PRS resources for one set minus 1

maxNrofPRS-ResourceOffsetValue-1-r17 INTEGER ::= 511

maxNrofGapId-r17 INTEGER ::= 8 -- Maximum number of measurement gap ID is FFS

maxNrofPreConfigPosGapId-r17 INTEGER ::= 16 -- Maximum number of preconfigured positioning measurement gap

maxNrOfGapPri-r17 INTEGER ::= 16 -- Maximum number of gap priority level

maxCEFReport-r17 INTEGER ::= 4 -- Maximum number of CEF reports by the UE

maxNrofMultiplePDSCHs-r17 INTEGER ::= 8 -- Maximum number of PDSCHs in PDSCH TDRA list

maxSliceInfo-r17 INTEGER ::= 8 -- Maximum number of NSAGs

maxCellSlice-r17 INTEGER ::= 16 -- Maximum number of cells supporting the NSAG

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

maxNrofSearchSpaceGroups-1-r17 INTEGER ::= 2 -- Maximum number of search space groups minus 1

maxNrofRemoteUE-r17 INTEGER ::=32 -- Maximum number of connected L2 U2N Remote UEs

maxDCI-4-2-Size-r17 INTEGER ::= 140 -- Maximum size of DCI format 4-2

maxFreqMBS-r17 INTEGER ::= 16 -- Maximum number of MBS frequencies reported in MBSInterestIndication

maxNrofDRX-ConfigPTM-r17 INTEGER ::= 64 -- Max number of DRX configuration for PTM provided in MBS broadcast in a

-- cell

maxNrofDRX-ConfigPTM-1-r17 INTEGER ::= 63 -- Max number of DRX configuration for PTM provided in MBS broadcast in a

-- cell minus 1

maxNrofMBS-ServiceListPerUE-r17 INTEGER ::= 16 -- Maximum number of services which the UE can include in the MBS interest

-- indication

maxNrofMBS-Session-r17 INTEGER ::= 1024 -- Maximum number of MBS sessions provided in MBS broadcast in a cell

maxNrofMTCH-SSB-MappingWindow-r17 INTEGER ::= 16 -- Maximum number of MTCH to SSB beam mapping pattern

maxNrofMTCH-SSB-MappingWindow-1-r17 INTEGER ::= 15 -- Maximum number of MTCH to SSB beam mapping pattern minus 1

maxNrofMRB-Broadcast-r17 INTEGER ::= 4 -- Maximum number of broadcast MRBs configured for one MBS broadcast service

maxNrofPageGroup-r17 INTEGER ::= 32 -- Maximum number of paging groups in a paging message

maxNrofPDSCH-ConfigPTM-r17 INTEGER ::= 16 -- Maximum number of PDSCH configuration groups for PTM

maxNrofPDSCH-ConfigPTM-1-r17 INTEGER ::= 15 -- Maximum number of PDSCH configuration groups for PTM minus 1

maxG-RNTI-r17 INTEGER ::= 16 -- Maximum number of G-RNTI that can be configured for a UE.

maxG-RNTI-1-r17 INTEGER ::= 15 -- Maximum number of G-RNTI that can be configured for a UE minus 1.

maxG-CS-RNTI-r17 INTEGER ::= 8 -- Maximum number of G-CS-RNTI that can be configured for a UE.

maxG-CS-RNTI-1-r17 INTEGER ::= 7 -- Maximum number of G-CS-RNTI that can be configured for a UE minus 1.

maxMRB-r17 INTEGER ::= 32 -- Maximum number of multicast MRBs (that can be added in MRB-ToAddModLIst)

maxFSAI-MBS-r17 INTEGER ::= 64 -- Maximum number of MBS frequency selection area identities

maxNeighCellMBS-r17 INTEGER ::= 8 -- Maximum number of MBS broadcast neighbour cells

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

-- ASN1STOP

Editor's note: *maxK0-SchedulingOffset* and *maxK0-SchedulingOffset* need confirmation by RAN1.

# 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, relay reselection, 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 or the (re)selected L2 U2N Relay UE becomes unsuitable, upon reception of *notificationMessageSidelink* indicating *relayUE-HO* or *relayUE-CellReselection*. | 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, upon cell change due to relay (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* for the MCG which does not include *sl-PathSwitchConfig*, or upon reception of *RRCReconfiguration* message including *reconfigurationWithSync* for the SCG not indicated as deactivated in the NR or E-UTRA message containing the *RRCReconfiguration* message or upon conditional reconfiguration execution i.e. when applying a stored *RRCReconfiguration* message including *reconfigurationWithSync*. | Upon successful completion of random access on the corresponding SpCell  For T304 of SCG, upon SCG release | For T304 of MCG, in case of the handover from NR or intra-NR handover, or path switch from a L2 U2N Relay UE to a NR cell, initiate the RRC re-establishment procedure; In case of handover to NR, perform the actions defined in the specifications applicable for the source RAT. If any DAPS bearer is configured and if there is no RLF in source PCell, initiate the failure information procedure.  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, upon reception of *MobilityFromNRCommand*, upon the reconfiguration of *rlf-TimersAndConstant,* upon initiating the connection re-establishment procedure, upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including *reconfigurationWithSync* for that cell group, and upon initiating the MCG failure information 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 5.7.3b or the connection re-establishment procedure as specified in 5.3.7 or the procedure as specified in 5.3.10.3 if any DAPS bearer is configured.  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 upon selection of a suitable L2 U2N Relay UE, or a cell using another RAT. | Enter RRC\_IDLE |
| T312 | If T312 is configured in MCG: Upon triggering a measurement report for a measurement identity for which T312 has been configured and *useT312* has been set to true, while T310 in PCell is running.  If T312 is configured in SCG and *useT312* has been set to true: Upon triggering a measurement report for a measurement identity for which T312 has been configured, while T310 in PSCell is running. | Upon receiving N311 consecutive in-sync indications from lower layers for the SpCell, receiving *RRCReconfiguration* with *reconfigurationWithSync* for that cell group, upon reception of *MobilityFromNRCommand*, upon initiating the connection re-establishment procedure, upon the reconfiguration of *rlf-TimersAndConstant*, upon initiating the MCG failure information procedure, upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including *reconfigurationWithSync* for that cell group, and upon the expiry of T310 in corresponding SpCell.  Upon SCG release, if the T312 is kept in SCG | If the T312 is kept in MCG initiate the MCG failure information procedure as specified in 5.7.3b or the connection re-establishment procedure.  If the T312 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. |
| T316 | Upon transmission of the *MCGFailureInformation* message | Upon receiving *RRCRelease*, *RRCReconfiguration* with *reconfigurationwithSync* for the PCell, *MobilityFromNRCommand,* or upon initiating the re-establishment procedure | Perform the actions as specified in 5.7.3b.5. |
| T319 | Upon transmission of *RRCResumeRequest* or *RRCResumeRequest1 when the resume procedure is not initiated for SDT.* | Upon reception of *RRCResume,* *RRCSetup, RRCRelease, RRCRelease* with *suspendConfig* or *RRCReject* message, upon cell re-selection or upon relay (re)selection. | Perform the actions as specified in 5.3.13.5. |
| T319a | Upon transmission of *RRCResumeRequest* or *RRCResumeRequest1* when the resume procedure is initiated for SDT. | Upon reception of *RRCResume,* *RRCSetup, RRCRelease,* *RRCReject* message or upon failure to resume RRC connection for SDT as specified in 5.3.13.5 or upon cell reselection. | 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 or SNPN 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 receiving *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.* |
| T330 | Upon receiving *LoggedMeasurementConfiguration* message | Upon log volume exceeding the suitable UE memory, upon initiating the release of *LoggedMeasurementConfiguration* procedure | Perform the actions specified in 5.5a.1.4 |
| T331 | Upon receiving *RRCRelease* message with *measIdleDuration* | Upon receiving *RRCSetup, RRCResume*, *RRCRelease* with idle/inactive measurement configuration, upon cell selection/reselection to a cell that does not belong to the *validityArea* (if configured)*,* or upon cell re-selection to another RAT*.* | Perform the actions as specified in 5.7.8.3. |
| T342 | Upon transmitting *UEAssistanceInformation* message with *DelayBudgetReport*. | Upon releasing *delayBudgetReportingConfig* during the connection re-establishment/resume procedures, and upon receiving *delayBudgetReportingConfig* set to *release.* | No action. |
| T345 | Upon transmitting *UEAssistanceInformation* message with *overheatingAssistance* | Upon releasing *overheatingAssistanceConfig* during the connection re-establishment procedure, upon initiating the connection resumption procedure, and upon receiving *overheatingAssistanceConfig* set to *release.* | No action. |
| T346a (The UE maintains one instance of this timer per cell group) | Upon transmitting *UEAssistanceInformation* message with *drx-Preference*. | Upon releasing *drx-PreferenceConfig* during the connection re-establishment/resume procedures, upon receiving *drx-PreferenceConfig* set to *release*, or upon performing MR-DC release*.* | No action. |
| T346b (The UE maintains one instance of this timer per cell group) | Upon transmitting *UEAssistanceInformation* message with *maxBW-Preference*. | Upon releasing *maxBW-PreferenceConfig* during the connection re-establishment/resume procedures, upon receiving *maxBW-PreferenceConfig* set to *release*, or upon performing MR-DC release*.* | No action. |
| T346c (The UE maintains one instance of this timer per cell group) | Upon transmitting *UEAssistanceInformation* message with *maxCC-Preference*. | Upon releasing *maxCC-PreferenceConfig* during the connection re-establishment/resume procedures, upon receiving *maxCC-PreferenceConfig* set to *release*, or upon performing MR-DC release*.* | No action. |
| T346d (The UE maintains one instance of this timer per cell group) | Upon transmitting *UEAssistanceInformation* message with *maxMIMO-LayerPreference*. | Upon releasing *maxMIMO-LayerPreferenceConfig* during the connection re-establishment/resume procedures, upon receiving *maxMIMO-LayerPreferenceConfig* set to *release*, or upon performing MR-DC release*.* | No action. |
| T346e (The UE maintains one instance of this timer per cell group) | Upon transmitting *UEAssistanceInformation* message with *minSchedulingOffsetPreference*. | Upon releasing *minSchedulingOffsetPreferenceConfig* during the connection re-establishment/resume procedures, upon receiving *minSchedulingOffsetPreferenceConfig* set to *release*, or upon performing MR-DC release*.* | No action. |
| T346f | Upon transmitting *UEAssistanceInformation* message with *releasePreference*. | Upon releasing *releasePreferenceConfig* during the connection re-establishment/resume procedures, or upon receiving *releasePreferenceConfig* set to *release.* | No action. |
| T346g | Upon transmitting *UEAssistanceInformation* message with *musim-PreferredRRC-State*. | Upon receiving *RRCRelease*, or upon receiving *musim-LeaveAssistanceConfig* set to *release*. | Perform the actions as specified in 5.3.8.6. |
| T346h | Upon transmitting *UEAssistanceInformation* message with *musim-GapPreferenceList* Information. | Upon releasing *musim-GapAssistanceConfig* during the connection re-establishment/resume procedures, or upon receiving *musim-GapAssistanceConfig* set to *release*. | No action. |
| T346i | Upon transmitting *UEAssistanceInformation* message with *scg-DeactivationPreference* | Upon releasing *scg-DeactivationPreferenceConfig* during RRC connection re-establishment/resume or upon receiving *scg-DeactivationPreferenceConfig* set to *release*. | No action. |
| T346j (The UE maintains one instance of this timer per cell group) | Upon transmitting *UEAssistanceInformation* message with *rlm-RelaxationReportingConfig*. | Upon releasing *rlm-RelaxationReportingConfig* during the connection re-establishment/resume procedures, upon receiving *rlm-RelaxationReportingConfig* set to *release*, or upon performing MR-DC release*.* | No action. |
| T346k (The UE maintains one instance of this timer per cell group) | Upon transmitting *UEAssistanceInformation* message with *bfd-RelaxationReportingConfig*. | Upon releasing *bfd-RelaxationReportingConfig* during the connection re-establishment/resume procedures, upon receiving *bfd-RelaxationReportingConfig* set to *release*, or upon performing MR-DC release*.* | No action. |
| T350 | Upon transmitting *DedicatedSIBRequest* message with *requestedSIB-List* and/or *requestedPosSIB-List*. | Upon acquiring the requested SIB(s) or posSIB(s), upon releasing *onDemandSIB-Request* during the connection re-establishment procedures, upon receiving *onDemandSIB-Request* set to release, upon reception of *RRCRelease* or upon successful change of PCell while in RRC\_CONNECTED. | 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 cell change due to relay (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. |
| T400 | Upon transmission of RRCReconfigurationSidelink | Upon reception of RRCReconfigurationFailureSidelink or RRCReconfigurationCompleteSidelink | Perform the Sidelink radio link failure related actions as specified in 5.8.9.3. |
| T420 | Upon reception of the *RRCReconfiguration* message including *sl-PathSwitchConfig* | Upon successfully sending *RRCReconfigurationComplete* message (i.e., PC5 RLC acknowledgement is received from target L2 U2N Relay UE) | Perform the RRC re-establishment procedure as specified in 5.3.7. |
| T430 | Start or restart from the subframe indicated by epochTime upon reception of SIB19 |  | Perform the actions as specified in 5.2.2.6. |